ENVIRONMENT
NEW BRUNSWICK

ENVIRONNEMENT
NOUVEAU-BRUNSWICK

CASIER POSTAL / P.O. BOX 6000, FREDERICTON, N.B., CANADA E3B 5H1

A COMPENDIUM OF COMMENTS
ON THE LEPREAU II EIS

Submitted to

the Environmental Assessment Panel

LIST OF SUBMISSIONS

Mr. George A. St. Onge
N. B. Department of Natural Resources
Combustion Engineering - Superheater Ltd.
Lepreau 2 Study Advisory Group
Energy, Mines, and Resources Canada
Rev. William Hart
N. B. Department of Transportation
Canada Dept. of Fisheries and Oceans
Environment Canada
Canadian Nuclear Association
Lepreau Emergency Planning Committee
Atomic Energy Control Board
Saint John Board of Trade
Saint John Fundy Region Development Commission, Inc.
N. B. Department of Social Services
The Canadian Manufacturers' Association
Electrical and Electronic Manufacturers Assoc. of Canada
Health and Welfare Canada
N. B. Department of the Environment
N. B. Department of Health

Box 452, R.R. 2
Lepreau, New Brunswick
EOG 2HO
11 August 1984

Mr. Gerry Hill
Environment New Brunswick
P.O. Box 6000
Fredericton, New Brunswick
E3O 5H1

Dear Sir:

Please present the attached brief to the Lepreau II Environmental Assessment Panel.

The recent news releases over the past several weeks concerning the disappointing response to the request for comments on the Environmental Impact Statement has prompted this submission. I must apologize for the tardiness of my response.

I have attempted to be objective in expressing my comments on those issues which, to my awareness, have not been adequately resolved. When these problems have been satisfactorily addressed, you may rest assured that Lepreau II will receive my full support and endorsement.

Yours truly,

George A St Onge

George A. St.Onge, P.Eng.

GAS:gs
attachment

AUG 15 1984

ENVIRONMENTAL IMPACT STATEMENT BRIEF

The Lepreau II Environmental Impact Statement and Summary has, in my opinion, adequately addressed the guidelines issued to Maritime Nuclear by the Environmental Assessment Panel.

The six priority issues of concern voiced by the public, government agencies, industry, labour, and the scientific community, were identified as follows:

1. Impact on biological environment.
2. Impact of radiation on humans.
3. Impact of the socio-economic environment.
4. Monitoring.
5. Emergency planning.
6. Decommissioning.

The information in the report has provided answers to all my questions and has alleviated my prime concern regarding radioactivity and the safety of my family living within a radius of 3.5 kilometres (2.2 miles) of the plant site.

However, my secondary concerns relating to the Emergency Planning and the practical implementation of it, raises several issues which have surfaced since the open-house meetings and the workshops held in the area.

One issue is the upgrading of the warning siren system or its replacement. A recent news release indicated that this matter would take approximately two years to implement! Surely, there must be some way to reduce that time period. Even a temporary system, manually operated, is superior to a malfunctioning, outmoded set-up. May I point out that this very extensive report, dealing with a great number of issues, was completed within six months! Top priority must be given to the resolution of this problem and the installation of a dependable warning system.

Another issue, is the Emergency Response Guide, which is considered to be very thorough by its creators, but which, if not in the hands of each area resident and not thoroughly understood by everyone, will certainly result in confusion and chaos in the event of an actual emergency. There must be an on-going dissemination of this 'Guide' to all new residents, summer residents, and returning former-residents. It should be the responsibility of the Wardens to ensure that the 'Guide' is distributed and understood by everyone in their domain. A follow-up procedure and regular public meetings of Wardens would, in my opinion, provide the area residents with a forum for an expression of their developing concerns and an arousal from their complacency.

Lepreau I is a fact of life, and N.B. Power must ensure that all plans for emergency action can be implemented with the minimum of confusion and the maximum of response from the area residents.

Those residents and organizations who have voiced their opposition to Lepreau II should not feel that any further submission of briefs on their part are a 'waste of time'. If they feel that their particular concerns and fears have been, or have not been, alleviated in any way, then they also have the responsibility to so state that, otherwise, their credibility will be in jeopardy. They must not let that happen.

Permit me to return to the subject of the Environmental Impact Statement, Lepreau II by quoting from the report:

> "All environmental and radioactivity regulations set out under provincial and federal laws and international guidelines to protect public health and safety have been examined, and this project is being designed to fall well within the regulations thereby established."

That Statement of Policy is a necessary condition for the design and development of Lepreau II and within the light of this and the total report, it is my opinion that every effort be made to expedite the total project to its earliest completion. The economic impact is both desirable and necessary for New Brunswick, the Atlantic Region, and Canada.

George A. St.Onge, P.Eng.
Maj. (ret.) CVSM, VM, CD
August 10, 1984

Inter - Office Memo
Note Interservices

77-1185 (1/83)

Your File No.: Votre réf.:

Department of: Ministère: Natural Resources

Our File No.: Notre réf.:

To: A: Paul Monti

Date: Date: August 13, 1984

From: De: P. J. Cronin

Telephone: Téléphone:

Copies To: Copies à:

Subject: Objet: LEPREAU 2 ENVIRONMENTAL IMPACT ASSESSMENT

A review of the "Lepreau 2 Environmental Impact Statement" indicates the lack of any reference being made to water level operating plans for the fresh water reservoir on Little Lepreau (or Hanson Stream).

The Department of Natural Resources has been attempting to manage the reservoir for a summer and winter brook trout fishery. Major changes to the operating regime may have detrimental effects on the fishery or to the safety of the users.

It would be much appreciated if the matter could be addressed. Please refer to previous memo dated November 22, 1983 to R. E. Hanusiak with copies to yourself.

P. J. Cronin

PJC/rmw

ENVIRONMENT N.B.
ENVIRONMENTAL SERVICES BR.

AUG 15 1984

FILE..............................

X FILE............................

CE CANADA

COMBUSTION ENGINEERING - SUPERHEATER LTD.
400 ENGLISH DRIVE, MONCTON INDUSTRIAL PARK
MONCTON, NEW BRUNSWICK E1E 3Y9
506-388-1122 TELEX 014-2100 SUPERHEAT MCTN

August 8, 1984

Mr. Carol Martin,
Manager Operations
Federal Environment Assessment Review Office
Fontaine Building, 13th Floor
Hull, Quebec

Dear Mr. Martin:

Re: Lepreau 2
Environmental Impact Statement

We have recently taken the opportunity to study the subject document prepared for Maritime Nuclear by consultants Washburn & Gillis Associates Ltd. dated May 1984 entitled "Lepreau 2 Environmental Impact Statement".

We are pleased to note the many advantages which Lepreau 2 will add to the benefits already being enjoyed in New Brunswick from the Lepreau 1 Project. It is gratifying to see that the local, Provincial and National economies can be expected to reap such great benefits without significant ecological impact.

As a manufacturer active in the nuclear industry we are excited about the Lepreau 2 Project and glad to anticipate its early initiation supported by this comprehensive Environmental Impact Statement.

While we do understand that the greatest benefits from the long term operation at Lepreau 2 will accrue to the immediate area surrounding the station, we would like to draw your attention to our ongoing participation at Moncton in the New Brunswick nuclear power community. Since 1978, in that city, this Company has operated a plant manufacturing nuclear fuel bundles. The New Brunswick Electric Power Commission is a major consumer for this fuel and we would hope to be successful in bidding to supply additional quantities for Lepreau 2. While the Environmental Impact Statement has obliquely considered this aspect at page 7-22 of the Statement, we would like to take this opportunity to apprise you of our Moncton activities and to give you some idea of the influence on the local scene.

Part of the reason for building a fuel plant in New Brunswick was the proximity to a potential market. Since both other nuclear power provinces (Ontario and Quebec) already possessed a nuclear fuel industry, there was no clear economic advantage to locating in those provinces. The Moncton plant was completed in 1978 and since then over 30,000 fuel bundles have been manufacatured for Lepreau 1, Ontario Hydro and an off-shore client. Peak production was achieved during 1982 when nuclear fuel was being manufactured for all three customers. Reduced demand, both domestically and overseas, has resulted in the plant now running below capacity and with a substantially reduced work force. With Lepreau 2 in operation, and with C-E Canada as a viable and competitive supplier, we would expect output to rise thereby providing about 120 jobs in Moncton.

While raw materials for nuclear fuel are not produced in-province, most other consumables and services are procured locally. At capacity we would expect such items to foster business worth $1.5 million per year in addition to an estimated $2.5 million per year in wages and salaries.

The presence of a high technology industry, such as nuclear fuel manufacturing, creates other spin-off benefits. Not least among these is the opportunity for technology graduates in the area to witness directly the industrial application of advanced manufacturing and laboratory techniques not otherwise available to them. In this connection, we have maintained a friendly and open relationship with teaching establishments in the area. Although the total number of technology graduates employed by our Moncton plant is not large, their number, as a percentage of the workforce, is considerable.

A less tangible aspect of our presence in Moncton is the opportunity provided, in a general way, for the average person not identified with either the "pro" or "anti" side of the nuclear debate to become aware of the issues. As with the Canadian nuclear industry as a whole, our record of environmental concern, together with a continuing excellent level of achievement in regard to health and welfare of employees, is second to none in industrial activity. Our employees and the general public can, from their own experiences, allay those concerns which are voiced when nuclear projects are first announced.

In conclusion, we would congratulate the authors of the Environmental Impact Statement on a job well done and would reiterate our strong support for the speedy commencement of Unit 2 at Point Lepreau.

Yours very truly,

C-E CANADA

for GHC.

G.H. Chalder
Manager - Nuclear Fuel

ENVIRONMENT
NEW BRUNSWICK

ENVIRONNEMENT
NOUVEAU-BRUNSWICK

AUGUST 9, 1984

Mr. R. J. Connolly
Dr. Leandre Desjardins
Co-Chairman, Lepreau 2
Environmental Assessment Panel
Federal Environmental Assessment Review Office
Ottawa, Ontario
K1A 0H3

Dear Sirs:

I am pleased to submit to you the Report of the Study Advisory Group for the Lepreau 2 Environmental Impact Assessment. I hope that you will find it's content helpful in your review of the Environmental Impact Statement and the Lepreau 2 project.

Yours sincerely,

Gordon Beanlands
Chairman

PM/jg

CASIER POSTAL / P.O. BOX 6000, FREDERICTON, N.B., CANADA E3B 5H1, TELEX: 014-46230

REPORT OF THE
STUDY ADVISORY GROUP
FOR THE LEPREAU II
ENVIRONMENTAL IMPACT ASSESSMENT

AUGUST 9, 1984

BACKGROUND

The Study Advisory Group (SAG) for the Lepreau II Environmental Impact Assessment consisted of Dr. Gordon Beanlands (Chairman), Dr. Gordon Butler, Dr. Allan Miller and Dr. Martin Thomas. The SAG met collectively and on an individual basis with representatives of the proponent, Maritime Nuclear, and their consultants on a number of occasions prior to the preparation of the EIS. Mr. Paul Monti, New Brunswick Department of the Environment, and Mr. Carol Martin, FEARO, acted as a secretariat to the SAG. Either Mr. Monti and/or Mr. Martin were present at all meetings between members of the SAG and the proponent or his consultants.

The SAG has reviewed the EIS as formally submitted to the Panel. This report is based on the results of a meeting of the SAG on June 20, 1984, and subsequent written comments from the members to the Chairman.

COMMENTS ON THE EIS

It was agreed by all members of the SAG that, within the context of the guidelines provided, the EIS is a credible document. In most, but not all cases, it is evident that the advice of the SAG has been taken into account as reflected in the approaches taken by the Consultants.

The methodologies proposed by the proponent in the conduct of the EIS studies were reviewed with the consultants during the meetings. There were no criticisms of these methodologies by the SAG during the final review of the EIS other than reflected in this report. In some instances, the EIS provides more information than required, but in a few areas it fails to fully meet the intention of the guidelines as interpreted by the SAG. However, in all instances where members of the SAG expressed strong concern about these differences, they voted that (1) the required information is readily available or (2) there is a need to describe existing situations beyond the control of the proponent, which place constraints on the EIS.

In summary, the EIS was considered to be a good report but needs amplification in a few specific areas to fully conform to the guidelines. Detailed comments to follow.

Consensus Issues

All members agreed that the report suffers from the lack of a clear description of the roles and responsibilities of all government agencies involved with the review, licensing and monitoring of nuclear power plants in Canada. It is clear that organizations such as NEB, AECB and NH&W are responsible for certain aspects of the proposed development which were excluded from the EIA guidelines, such as the export of power, the economics of production, personnel training, public health and plant safety.

However, there is no indication of how these agencies interact and whether their programmes are conducted in a coordinated manner. Since their responsibilities include key components of a comprehensive EIA, the general public should be informed of the procedures and protocols whereby they coordinate their activities. This was a specific suggestion made by the SAG during the meetings with the proponent. It may be that this is a priority topic to be pursued by the Panel during the public hearings. In any case, the SAG feels that this is an important area which should be reviewed in the public forum before the Panel formulates its recommendations.

The second general issue on which there was unanimity among the SAG is related to the first, but focuses particularly on monitoring. There is no description of the allocation of responsibilities for monitoring among the proponent and federal and provincial agencies. While some monitoring activities are reviewed, there is no mention of mechanisms whereby the various activities are cooridnated and integrated into a commprehensive monitoring programme. If such a mechanism does not exist it is important that the Panel be made aware of such a deficiency, even though it may not be the responsibility of the proponent to undertake such a coordinating role.

The last major point of consensus is also related to monitoring. All members of the SAG expressed concern over the lack of reference to the monitoring of the effects of radioactive emissions on the general population living in the vicinity of the plant. The proponent described the monitoring of plant workers and various non-human components of the environment. However, there is no mention of a monitoring programme focused on the human population in the area. The SAG is not clear if this was an omission in the EIS or a reflection of the true situation. In any event, the proponent should clarify this for the benefit of the general public as well as the Panel.

Specific Comments

(a) Biological

- The assumption that the marine system at Point Lepreau is an "open ocean system" is an oversimplification. It may apply to pelagic systems and to some extent to benthic communities, but it does not apply to the shallow water and intertidal systems. This assumption, therefore, cannot be used as the rationale for recommending no biological monitoring of the effects of the cooling water plume.

- Contrary to the conclusion in Section 8, there should be a monitoring programme established to follow potential changes in the intertidal community that could be affected by the cooling water plume (growth, production, structure, etc.). Suitable methods are available and monitoring on an annual or semi-annual basis would not be costly. Even a confirmation of no effect would be helpful.

- In the section on marine ecology (3.2.2) there is an overemphasis on a description of the offshore communities. Since later in the report it is stated that the measurable impacts are most likely to occur in the shallow water communities, these should be described in much greater detail in the earlier sections of the report.

(b) Radiological

- The presentation of information on radioactive environmental contamination is confusing since it is divided between Sections 3 and 5. Furthermore, there is virtually no description of pathways leading to man other than the modelling studies conducted by the Bedford Institute of Oceanography which are not primiarily concerned with effects on humans.

- The monitoring programme needs to include on-going sampling based on a food chain model for estimating intake by humans.

- Appendix B could be strengthened with more details concerning the planning for decommissioning in Canada. Such information is readily available from AECB in Ottawa (Dr. M. White) and AECL CANDU Operations in Montreal (Dr. J. Saroudis).

(c) Socio-economic

- Section 4.1 provides only a physical description of the proposed plant and, despite suggestions from the SAG, omits all mention of the human systems involved. This is seen as a serious omission in the EIS which could be rectified by the addition of a sub-section describing the role of people in the construction and operation of the plant.

- The EIS could have been improved with greater reliance on data and experience drawn from the operation of Lepreau I as opposed to the use of generic models. This was partic-

ularly true for the sections on the effects on the provincial economy, labour requirements, labour management and manpower training problems (eg. vandalism, labour disputes, work scheduling).

- While the EIS discussess in some detail the benefits to be derived from Lepreau II, there is no discussion of cost (associated, for example, with the siphoning of money from other projects and regions in the province). In other words, a true cost-benefit analysis was not undertaken.

RECOMMENDATIONS

Before the Panel formulâtes its recommendations and report to the Ministers, it should obtain further information or clarify the situation with respect to the following items raised by the SAG. Whether this requires further submissions from the proponent prior to, or during, the public hearings is for the Panel to decide.

1. A general description of the relationship between the roles and responsibilities of all government agencies involved in the planning, review, licensing and monitoring of nuclear power plants in Canada.

2. A general description of the roles and responsibilities of all parties involved with monitoring the environmental and human health impacts of radioactive emissions from the proposed plant, for both normal and upset conditions.

3. An expansion of the proposed monitoring programme to include monitoring based on food chain models for estimating human intake.

4. A detailed description of shallow water and intertidal systems potentially affected by the cooling water plume and a monitoring programme to measure changes in these systems.

5. Further information on plans for decommissioning nuclear power plants in Canada.

6. A description of the "human systems" component of the proposed plant drawing upon data and experience from the construction and operation of Lepreau I.

Gordon E. Beanlands
Chairman, SAG

Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

Ottawa, Ontario
K1A 0E4
Ottawa (Ontario)
K1A 0E4

580 Booth St., 20th Floor

Your file Votre référence

Our file Notre référence

August 7, 1984

Mr. Carol Martin
Secretary
Point Lepreau Nuclear Generating
Station Panel
Federal Environmental Assessment
Review Office
Fontaine Bldg.
Hull, Quebec
K1A 0H3

Dear Mr. Martin:

Attached are comments from the Department of Energy, Mines and Resources on the Environmental Impact Statement for the Point Lepreau Nuclear Generating Station.

Comments from this Department are confined to aspects of the geological sciences having potential to impact on the project.

Yours sincerely,

H.C. Rothschild
Director
Office of Environmental
Affairs

Attach.

STATEMENT TO THE ENVIRONMENTAL ASSESSMENT PANEL

ON

THE POINT LEPREAU NUCLEAR GENERATING STATION

Department of Energy, Mines & Resources
August 2, 1984

The Department of Energy, Mines and Resources is the branch of the Federal Government responsible for conducting research in the earth sciences. Evaluation of the Environmental Impact Statement for the Lepreau II project was confined to sections of the Report dealing with the geological environment. The issues of interest to an assessment are those aspects of the geological regime having the potential to affect the foundation stability of engineering works.

The principal factors affecting foundation and structure stability are seismic ground motion and displacement along faults. Point Lepreau is 10 to 15 kilometers from a major fault that extends along the coast of Maine and New Brunswick and can be traced eastward through Nova Scotia. Branches of this fault can be seen in northern Nova Scotia and Cape Breton Island where evidence of recent movement is seen as minor displacement in the bedrock and in the overlying materials. This evidence in Cape Breton is the only documented case of relatively recent reactivation of a major fault of long history.

Slate beds occurring throughout the Maritime region commonly show minor displacements. These slates show post-glacial cumulative displacement of several centimeters in the Saint John area. However, these displacements are considered likely to represent movement by creep resulting from post-glacial rebound rather than from a single-episode seismic event.

It is the opinion of this Department that fault movement other than as a source of seismic activity poses no significant threat to structures installed at the Point Lepreau site.

Seismic risk assessment is a subject that has not been treated in the Environmental Impact Statement. It is known that fault movements at depth do generate seismic events most recently evidenced by the 1982 Miramichi earthquake. Therefore important items to be considered in addressing seismic risk assessment are as follows:

.../2

a) An interpretation based on the 1982 Miramichi, New Brunswick earthquakes for the potential of similar earthquakes to occur in future at other locations in New Brunswick;

b) An assessment of the largest possible size of such earthquakes and their closest approach to the Lepreau site;

c) An interpretation, based on data acquired from the Miramichi and other earthquakes, of the vibratory ground motion that would be produced at the Lepreau site by the largest potential earthquake at its closest approach;

d) An assessment of information available on historical earthquakes of New Brunswick and Maine, and an interpretation of such information in terms of the possibility of large events near the Lepreau site;

e) An interpretation of information available for the seismically active region of Passamaquoddy Bay and the largest event in this region that might affect the Lepreau site;

(f) An assessment of the seismic activity in the Bay of Fundy and interpretation of the possibility of large earthquakes associated with fault systems that extend eastward through Nova Scotia and onto the continental shelf.

It is understood that the Atomic Energy Control Board (AECB) has established standards and guidelines for seismic qualification of Candu nuclear power plants. The standards require that the proponent undertake and submit to the AECB a comprehensive report on its investigations. It is understood also, that the report has been completed for Maritime Nuclear and that it addresses the considerations that have been previously enumerated. The Department of Energy, Mines and Resources has agreed to review the Maritime Nuclear Report and to provide to the AECB its opinion on the proposed seismic design criteria.

Clifton Royal RR 2
N.B. E0G 1N0
August 7, 1984

Dear Jerry I am sorry I did not get this letter to you before the deadline of Aug 7. It has been more complicated than I anticipated. I wish to make a presentation before a final decision is made to build or not to build Lepreau II.

I include some questions you might ~~keep~~ help me answer. Has a satisfactory practice evacuation been held if there should be a critical emergency? Why do four sirens out of six fail to sound the alarm? Are there special measures to evacuate the 2500 residents of Grand Manan?

On page 7-36 of the EIS under the heading 7.8.1, Summary of Lepreau I it is stated "Construction of Lepreau I began in 1974, with the plant entering commercial service in January, 1983, at a cost approaching $1.45 billion." Does the figure 1.45 billion include the cost of interest?

How can New Brunswick compete in price on power sold to New England and New York with Quebec which has vast reserves in power in James Bay Hydro project and for many years to come hydro power for many years to come at very low cost from Churchill Falls in Labrador?

These are some of my concerns about Lepreau?

Sincerely

William [illegible] Hart C.M.

AUG 10 1984

Inter - Office Memo
Note Interservices

77-1185 (1/83)

Your File No.:
Votre réf.:

Department of:
Ministère: Transportation

Our File No.:
Notre réf.: 132-D

To:
A: Paul Monti, Panel Secretariat
Environmental Assessment Panel - Lepreau II

Date:
Date: August 7, 1984

From:
De: B.L. McEwing

Telephone:
Téléphone:

Copies To:
Copies à:
D.L. Scheult
L.W. Smith
F.V. Maddox
P.E. Rouse

Subject:
Objet: Environmental Impact Statement (EIS) By Maritime Nuclear

---

Per your request, please be advised that our department has reviewed the final draft of the above mentioned EIS and find it totally inadequate with respect to what has been included in Section 7.8.7 on transportation impacts.

I am attaching the preliminary analysis of traffic volumes and transportation impacts which was originally prepared by Washburn and Gillis Associates Ltd. and our feedback and response (as requested) to the preliminary analysis.

As expressed in the attached correspondence to the consultant from our Deputy Minister, the Department of Transportation is of the opinion that Lepreau II will necessitate the expansion of the existing Route 1 from Musquash River to Route 790 from 2-lanes to 4-lanes, and that an interchange would be required at the intersection of Route 1 and Route 790.

It is our department's position that these concerns and possible transportation impacts must be identified in the EIS document and that the necessary funding for any required highway improvements brought about by the construction of Lepreau II be identified as a responsibility of the proponent.

B.L. McEwing

B.L. McEwing

1784-1984

began to return to a normal balance in late 1983 (R. Kincaid, Kincaid Realty and R. Patstone, Patstone Realty, personal communication to J. Paynter, 1984).

Although the above property value cycle correlates closely with Lepreau 1 activity, the results should be interpreted with caution as precisely during the same periods, the housing market throughout North America was experiencing similar dynamics due to poor economic activity and high mortgage rates. It is likely that the initial price appreciation was due to Lepreau 1; however the fall in property values was probably due to high interest rates. At present, sales volumes are increasing as the economy brightens and interest rates are low. Without Lepreau 2, prices in the Saint John area are expected to increase in the order of 15 per cent; with Lepreau 2, it is likely that rates of increase will exceed 15 per cent (R. Kincaid, Kincaid Realty, personal communication to J. Paynter, 1984).

7.8.7 Transportation Impacts

During the construction phase of Lepreau 1, traffic volumes on Routes 1 (between Lepreau and Saint John) and 790 increased substantially. It is expected that most of the workforce for Lepreau 2 will commute from the Saint John CMA and thus traffic volumes on Route 1 and 790 are expected to increase substantially over normal levels as projected by the Department of Transportation.

Discussions with Department of Transportation officials indicate that when a level of service on a portion of a provincial highway is reduced, recommendations are made to senior management for corrective action (B. McEwing, N.B. Department of Transportation, personal communication to J. Paynter, 1983).

7.8.8 Community Cohesion, Lifestyle

Community cohesion as considered here relates to the homogeneity of people and values within a community, its territorial integrity and its degree of stability (cf.: Griesman, 1980). Community cohesion and lifestyles reflect the well-being of Point Lepreau area residents and their ability to respond to change. The unincorporated communities between Pennfield and Prince of Wales cannot be collectively considered as one large community. They vary greatly in social character, in their internal cohesion, in their attitudes toward development and in their willingness to become part of a larger political unit such as a local service district.

A difficulty in assessing changes in community cohesion and lifestyle is that, according to the literature, effects of large projects vary. Webb, Krannich and Clemente (1980) in their study of eighty-five rural area communities concluded that "local" inhabitants perceived largely salutary effects from such developments. Other studies describe the negative implications of large-scale industrial projects upon communities (see for example the boom/bust literature as in Foote, 1979).

The assessment of the impact of Lepreau 2 is further complicated by other changes occurring in the community. By the time the facility comes on line, the characteristics of the communities involved may change under

DEPUTY MINISTER OF TRANSPORTATION
FREDERICTON, N.B.

R FILE NO.: 132-0
OTRE NO DE FICHE:

SOUS-MINISTRE DES TRANSPORTS
FREDERICTON, N.B.

P. O. Box 6000
Fredericton, N. B.
E3B 5H1

March 28, 1984

Mr. Owen V. Washburn, P. Eng.
Washburn & Gillis Associates Ltd.
Environmental Consultants
70 York Street
Fredericton, N. B.
E3B 3N5

Dear Mr. Washburn:

Attached please find a copy of comments prepared by my staff pertaining to the Analysis of Traffic on Lepreau II.

Lepreau II will necessitate the expansion of the existing Route 1 from Musquash River to Route 790 from 2-lanes to 4-lanes, and that an interchange would be required at the intersection of Route 1 and Route 790.

These above factors should be taken into account by the appropriate authorities since this Department has not considered the twinning of this segment of Route 1 nor the construction of an interchange at Route 1 and Route 790 in future budgetary requirements.

Sincerely,

Original signed by
D. L. SEHEULT

D. L. SEHEULT

Enclosure

1784-1984

Inter - Office Memo
Note Interservices

77-1185 (1/83)

Your File No.: / **Votre réf.:**

Department of: / **Ministère:** Transportation

Our File No.: / **Notre réf.:** 132-0

To: / **A:** D. L. Seheult
Deputy Minister

Date: / **Date:** March 28, 1984

From: / **De:** P. E. Rouse
Director of Planning

Telephone: / **Téléphone:**

Copies To: / **Copies à:** F. V. Maddox

Subject: / **Objet:** LEPREAU II, ANALYSIS OF TRAFFIC BY WASHBURN AND GILLIS

Attached please find the comments made by Rino Beaulieu pertaining to the Analysis of Traffic on Lepreau II as drafted by Washburn and Gillis. I understand the appendix was prepared by DPA (Jacques Paynter) who is a sub-contractor to Washburn and Gillis.

I agree with the observations made by Mr. Beaulieu.

P. E. Rouse
Director of Planning

/mns
Enc.

1784-1984

Inter - Office Memo
Note Interservices

77-1185 (1/83)

Your File No.: / Votre réf.:

Department of: / Ministère: Transportation

Our File No.: / Notre réf.: 132-0

To: / À: P. E. Rouse
Director of Planning

Date: / Date: March 19, 1984

From: / De: Rino Beaulieu, P. Eng.

Telephone: / Téléphone:

Copies To: / Copies à:

Subject: / Objet: LEPREAU II, APPENDIX F
ANALYSIS OF TRAFFIC

Attached please find a copy of Appendix F, Analysis of Traffic of the Washburn and Gillis Impact Study on Lepreau II.

Also attached thereafter you will find my comments on the Analysis of Traffic.

In summary it is my opinion that:

1) Lepreau II would cause the need of expanding the existing Route 1 facility between Musquash and Lepreau to 4-lanes at least 4 years sooner than normally expected.

2) Lepreau II would cause the requirement of an interchange at the intersection of Route 1 and Route 790.

Rino Beaulieu

Rino Beaulieu, P. Eng.

/mns
Enc.

March 19, 1984

LEPREAU II

COMMENTS ON APPENDIX F

ANALYSIS OF TRAFFIC

Page F1 - 3rd Paragraph

"Route 790 is a two-lane, all weather road which serves as a collector road for the Point Lepreau area communities of Little Lepreau, Maces Bay, Dipper Harbour and Chance Harbour".

Comment:

Provincially, Route 790 is considered a local road. It has, however, been given the all weather road designation because of its access feature to Lepreau I.

Page F4 - 2nd Paragraph

"On the basis of the above information, it is expected that traffic volume impacts due to Lepreau II will primarily occur on Route 790 and Route 1 between the City of Saint John and Lepreau".

Comment:

Given the existing demographics this is probably true.

Page F5 - Table F-2

"Estimated average daily vehicular traffic (Construction Phase, Lepreau II)".

Comments:

The vehicle occupancy of 2.5 is rather high. The ITE Handbook shows that work related trips cause an occupancy rate of 1.4 to 1.6. In terms of trip generation, ITE shows an average of 3 trip

Comments: (cont'd)

ends per employee per day for Land Use Type Industrial. However, this cannot be disputed further if this 2.5 occupancy rate is based on actual experience related to the construction of Lepreau I.

Page F6 - 1st Paragraph

"For the purpose of analysis, it is assumed that 75-80% of total passenger vehicles will be inbound or outbound between Saint John and the plant site during a one-hour journey to/from work morning and evening period".

Comments:

1) The 75-80% to/from Saint John traffic flow is realistic.
2) The "and" indicates that Table F-2 represents one-way traffic volumes.

Page F6 - 2nd Paragraph

"The accepted capacity for a two lane way roadway under ideal conditions is 2000 VPH."

Comments:

The accepted theoritical capacity for a two lane two way roadway under ideal conditions is 2000 VPH.

From the Capacity Manuel (Pg 300)

"At Level of Service E, or capacity, actual operating speeds will usually be in the neighborhood of 30 mph (50 km/h), but may vary considerably. Volumes, total for both directions, under ideal conditions, will be 2000 passenger cars per hour." Frequently, Level E is never attained as volume builds up; instead, a transition into Level F occurs directly from Level D".

This shows why the Planning Branch of the New Brunswick Department of Transportation will begin to closely monitor segments of the arterial highway system when they begin to operate at Level of Service D. It is recommended to provide improvements which will not allow the level of service to further deteriorate. (i.e. attain capacity).

The accepted capacity (service volume) on arterials in New Brunswick from the Planning Branch point of view is that of Level of Service C. The service volume of Level of Service C is 1400 VPH. The calculated service volume at Level of Service C for this segment of Route 1 is 1171 VPH or approximately 1200. (see Page F9).

The forecasted AADT without Lepreau II for 1988 are 9308 (high) and 6699 (low). The 1988 high-low average is 8004 AADT. Fifteen percent of this number is 1200 VPH. This is the design hourly volume which would be selected by this Branch. It can be concluded based on the foregoing that the existing Route 1 facility will not be subject of Level of Service D prior to the year 1989.

Similar calculation shows that should Lepreau II construction become a reality as scheduled, this segment of Route 1 would operate at Level of Service D by 1985. Lepreau II would thus reduce the life of this segment of Route 1 by 4 years.

Page F9 - Last Line 2nd Paragraph

"--- by 1990 peak hour traffic volumes will likely exceed 2000 VPH".

Comment:

This observation is based on the high estimate. It is not very likely. Using high-low averages the DHV in 1990 would be in the vicinity of 1300 VPH. (assuming no Lepreau II).

Page F9 - 3rd Paragraph

"--- once a portion of a route is classified at Level of Service "D" or worse, it is identified as being deficient and recommended for remedial action to Senior Management".

Comment:

This is true. In this case, if Lepreau II is proven to be the cause of premature investment on Route 1 it will be identified as such to Senior Management.

Experience shows that if a highway facility is not subject to an abrupt increase of traffic volume (similar to that of Lepreau II) it may be allowed to operate at Level of Service "D" for a number of years.

Senior Management could not take advantage of the "Buffer Years" of Level of Service "D" should Lepreau II become a reality. This would mean an additional loss of 8 to 10 years of the existing Route 1 between Musquash River and Route 790.

Page F10 - 4th Paragraph

"Since traffic volumes on Route 1 are sufficiently high to warrant possible twinning of that highway between Musquash and Lepreau, a detailed capacity analysis of the Route 1/790 intersection was not undertaken".

Comment:

Lepreau II causes traffic volumes on Route 1 to become sufficiently high to warrant twinning.

Page F10 - Last Paragraph

"The Route 1/790 intersection will become a serious bottleneck during peak commuting periods, which would be alleviated by signalization and properly marked traffic lanes (eg., Doak Road, Vanier Highway) since it is recognized that a level intersection can handle as much traffic as an interchange if properly signalized or about 100,000 vehicles/day if there are enough lanes".

Comment:

This intersection could not function similarly to the Doak Road intersection because it is located in a rural area. The Doak Road is in the fringe area of Fredericton and may be considered as urban.

Page F11, Last Line

"However, Route 1 is not the place for signalization, and there is probably a need for grade separation".

Comment:

This is true. Lepreau II if it becomes a reality, will be the direct cause for the need of this interchange.

APPENDIX F

ANALYSIS OF TRAFFIC

F.1 Existing Transportation System

The Saint John/Charlotte County Region is served by two major provincial highways: Route 7 connects the Saint John area with Fredericton to the north; and Route 1 which links the Bay of Fundy coastal communities from St. Stephen to Saint John as well as the urban centres of Sussex and Moncton to Saint John. These routes serve as the main trunk service and are two-lane, all weather roads with the exception of a four-lane portion of Route 1 between Musquash and Saint John.

The Point Lepreau area is approximately 35 km west of Saint John or about 25 minutes' travel time by automobile via Route 1. At present, Route 1 offers level of service "C" (satisfactory operating speeds and maneuverability) to the Lepreau area. Average hourly traffic volumes are moderate and passing sight distance restrictions are minimal.

Route 790 is a two-lane, all weather road which serves as a collector road for the Point Lepreau area communities of Little Lepreau, Maces Bay, Dipper Harbour and Chance Harbour. During the construction of Lepreau I, this road was realigned to by-pass Little Lepreau and intersect with Route 1 in a more direct manner.

F.2 Historic Traffic Volumes

Traffic volumes are expressed as Annual Average Daily Traffic (AADT) and measured by counters placed at various locations on routes.

There are four permanent counters located in the study area:

Route 1	Oak Bay
Route 1	Lepreau (PC 1-8-1)
Route 3	Harvey
Route 7	Geary By-Pass

Two temporary counters (counts taken six days per year, every other year) have been located on Route 790 approximately 3 kilometers south of Route 1, and on Route 1 approximately 1.5 kilometers east of Musquash. The former counter has only been in operation since 1979 and the latter since 1973.

Historic Traffic Volumes are indicated in Table F-1. A comparison of the AADT with the Lepreau I peak construction years (1979, 1980) shows an increase (8.8%), above the normal percentage annual increase in the province (3.6%), recorded at temporary counter 1-10-1. A sharp decline was recorded after 1980 at temporary counter 790-3-1 reflecting the reduction in construction traffic related to the plant site. However, this must be evaluated with caution as no data previous to 1979 are available.

Oak Bay, Lepreau and Harvey counters all exhibit peaks in 1979/80, with reductions occurring in 1981 and 1982. Therefore, these AADT

TABLE F-1

HISTORIC TRAFFIC VOLUMES (OBSERVED AADT) 1973 - 1978

	Counter Location					
Year	Route 790 (790-3-1)	Route 1 (1-10-1)	Route 1 (Oak Bay)	Route 1 (Lepreau) (1-8-1)	Route 3 (Harvey)	Route 7 (Geary)
1973		2900	3650	2220	1850	2440
1974			3810	3000	1870	2500
1975		4280	4170	3450	1880	1950
1976			3860	3540	1970	1950
1977		4070	4230	3750	2050	2280
1978			4810	3400	2060	1880
1979	4000	6380	4600	3650	2180	2430
1980			4920	3710	2140	2400
1981	2060	5650	4610	3410	2080	2890
1982			4560	3360	1980	2370
1983	1000-1200	2484	N/A	N/A	N/A	N/A

Source: N.B. Department of Transportation

* 1973 - 1977 not permanent counter

1978 - 1980 perceived counter malfunction increases can reasonably be attributed to vehicular activity related to Lepreau I. Route 7 exhibits a significant peak in 1981 which may be partially explained by the opening of the new alignment of that route and movements related to a large military exercise in August 1981.

On the basis of the above information, it is expected that traffic volume impacts due to Lepreau II will primarily occur on Route 790 and Route 1 between the City of Saint John and Lepreau.

This conclusion has been substantiated by comments of interviewees in the region; apparently traffic volumes and passing/speeding practices on Route 1 west of Lepreau,1I during peak journey to work periods were sufficiently "abnormal" as to deter most local residents from using the road during those times.

As the Table also indicates, traffic volumes have remained higher during plant operation (1981/82) than was previously recorded before construction began in earnest (1977/75?). It would appear reasonable to assume that AADT will probably exhibit natural increases from a 1982 baseline.

F-3 Construction Related Traffic Volume Lepreau II

An estimate of construction-related traffic volumes is indicated in Table F-2. Calculations are based upon accepted practice according to

TABLE F-2

ESTIMATED AVERAGE DAILY VEHICULAR TRAFFIC (CONSTRUCTION PHASE, LEPREAU II)

Year	Trucks[1] (Aggregate)	Trucks[2] (Other)	Passenger Vehicle[3] Equivalents	Passenger Vehicle[4] Workforce	Passenger Vehicle[5] Supervisory	Total Vehicles (Including Trucks)	Total Passenger Vehicles
1985	8	15	69	174	67	310	241
1986	18	15	99	202	77	378	279
1987	6	15	63	289	111	463	400
1988	1*	15	45	655	251	951	906
1989	0	15	45	490	188	723	678
1990	0	15	45	174	67	286	241

Notes: 1. 115,000 c.y. (@ 19 cy/truck)

2. Assume construction material delivery @ 12.5T/truck, uniform distribution of total commodity input during project life cycle; also assumes 5 trucks per day for contractor's tools, equipment and shop supplies.

3. Assume 1 truck = 3 vehicles for fairly level terrain.

4. Assume vehicle occupancy rate = 2.5.

5. Estimated at 23% of construction workforce; assumes vehicle occupancy rate = 1.5.

* Period January - March only.

F6

the Highway Capacity Manual and assumptions developed upon the basis of actual experience related to the construction of Lepreau I.

Peak traffic volumes are anticipated to occur in 1988 (906 vehicles, 951 vehicles including trucks). For the purposes of analysis, it is assumed that 75 - 80% of total passenger vehicles will be inbound or outbound between Saint John and the plant site during a one-hour journey to/from work morning and evening period.

In Table F-3 total Lepreau passenger vehicles and future AADT are converted to vehicles per hour (VPH) for peak hour to provide a measure of total expected peak hour volume by year. As the Table indicates, peak hour volume will exceed 2000 VPH in 1987 (high forecast AADT) and 1988 (low forecast AADT). The accepted capacity for a two lane, two way road way under ideal conditions is 2000m VPH.

The commonly accepted method for determining traffic volumes relative to capacity is to analyse the thirtieth-highest hourly volume in any given year. An analysis of the thirtieth-highest hour volume on Route 1 was conducted. The results are outlined in Table F-4.

As the Table indicates, a thirtieth-highest hour volume of approximately 1600 VPH is reached in 1987, assuming a low forecast AADT. Assuming a high forecast AADT, a thirtieth-highest volume of approximately 1900 VPH is reached in the same year.

TABLE F-3

PEAK YEAR/PEAK HOUR TRAFFIC VOLUME, BOTH DIRECTIONS, ROUTE 1

Year	Lepreau II Passenger Vehicles	Lepreau II Volume[1] (VPH)	Forecasted[2] AADT		Calculated[3] Peak Hour Volume		Total Future Peak Hour Volume (VPH)	
			High	Low	High	Low	High	Low
1987	400	320	8,860	6,608	1,772	1,321	2,092	1,641
1988	906	725	9,308	6,699	1,861	1,340	2,586	2,065
1989	678	543	9,755	6,790	1,951	1,358	2,494	1,901

Notes: 1. Assume 80% of vehicles distributed over 1 hour.

2. Source: N.B. Department of Transportation; Control Section 9 Route 1.

3. 19.7% of forecasted AADT.

TABLE F-4

30TH HIGHEST HOUR TRAFFIC VOLUME, BOTH DIRECTIONS, ROUTE 1

Year	Lepreau II Vehicles	Average Volume[1]	Forecasted AADT		Calculated 30th Highest[2] Hour Volume (VPH)		Total Future 30th Highest Hour Volume (VPH)	
			High	Low	High	Low	High	Low
1987	400	720	8,860	6,608	1,916	892	1,916	1,612
1988	906	1,630	9,308	6,699	1,256	904	2,886	2,534
1989	678	1,110	9,755	6,790	1,316	916	2,536	2,136

Notes: 1. 90% of Lepreau vehicles disltributed over 1/2 hour and doubled.

2. 13.5% of forecasted AADT.

The Department of Transportation has established standards of service for Route 1 in this vicinity. The level of service is related to the traffic volumes as follows:

Level	Volume (VPH)
A	300
B	711
C	1171
D	1465
E	1751

Traffic impacts on Route 1 due to construction workforce commuting will cause the portion of Route 1 between Saint John and Musquash to be downgraded from level of service "B" to level of service "E", (unstable flow; occasional traffic stoppages with volumes at or near capacity of the highway), during the construction period (1987-1990). Although traffic volumes will decline by 3-10 per cent under plant operating conditions in accordance with historic AADT, by 1990 peak hour traffic volumes will likely exceed 2000 VPH.

Discussions with N.B. Department of Transportation officials (B. McEwing, personal communication to J. Paynter) indicate that once a portion of a route is classified level of service "D" or worse, it is identified as being deficient and recommended for remedial action to Senior Management. In the case of Route 1, it would appear that corrective action may require the extension of the existing four-lane highway past Musquash to Lepreau.

Intersection Routes 1/790

In 1977, Route 790 was realigned to intersect with Route 1 in a more direct fashion. Route 790 is the only means of vehicular access to the plant site, and in the light of the above analysis, the route 790/route 1 intersection is anticipated to become a serious traffic bottleneck.

In its present configuration, there is a left turn lane when approaching the intersection from the east and a right turn deceleration lane when approaching from the west. There is also a right turn lane on Route 790. There are no curbs, barriers or signals; and lanes are delineated with highway paint.

Since most of the Lepreau bound traffic during the construction period is expected to originate in the east in the morning, severe congestion is likely to result from these vehicles attempting to turn left (south) onto Route 790 against an oncoming easterly flow of commuters destined to Saint John.

Similarly, in the evening, traffic will be backed up on Route 790 as the Lepreau workforce attempts to gain access to Route 1 to head back to Saint John.

Since traffic volumes on Route 1 are sufficiently high to warrant possible twinning of that highway between Musquash and Lepreau, a detailed capacity analysis of the Route 1/790 intersection was not undertaken.

The Route 1/790 intersection will become a serious bottleneck during peak commuting period, which could be alleviated by signalization and properly marked traffic lanes (e.g., Doak Road, Vanier Highway) since it is recognized that a level intersection can handle as much traffic as an interchange if properly signalized or about 100,000 vehicles/day if there are enough lanes. However, Route 1 is not the place for signalization, and there is probably a need for grade separation.

Fisheries and Oceans
Pêches et Océans

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Your file Votre référence

Our file Notre référence

August 7, 1984

Dr. Leandre Desjardins
and Robert Connelly
Co/Chairman, Lepreau II Environmental
Assessment Review Panel
Federal Environmental Assessment
Review Office
Fontaine Building
Hull, Quebec

Gentlemen:

We are pleased to submit to you the technical review of the Point Lepreau II Nuclear Generating Station Environmental Impact Statement prepared by the Department of Fisheries and Oceans. We trust the comments provided will be useful and should any further information be required we would be pleased to provide it.

Louis Tousignant
L. Tousignant
ADM Policy and Program Planning

Canada

GOVERNMENT OF CANADA

DEPARTMENT OF FISHERIES AND OCEANS

TECHNICAL REVIEW
OF
POINT LEPREAU II NUCLEAR GENERATING STATION
ENVIRONMENTAL IMPACT STATEMENT

Compiled by

OSS Atlantic

on behalf of the

Department of Fisheries and Oceans

July 31, 1984

The Point Lepreau II Environmental Impact Statement (EIS) has been reviewed by scientific and technical staff within the Department of Fisheries and Oceans (DFO). DFO has examined this volume from two viewpoints; firstly, from a concern and responsibility for fish, fisheries and fish habitat, which necessitates that the Department review the proposed project to ensure that it does not pose a threat to the resource, to fishing operations, or to fishing harbours; and secondly, the Department, having a broad range of technical and scientific expertise in both marine and fresh water environments comments on aspects of the document dealing with hydrography, oceanography, fisheries and ecology. This expertise includes site specific expertise gained from the Point Lepreau Environmental Monitoring Program, As a result of this examination the following major omissions/deficiencies in the EIS have been identified.

A. RELEASE OF RADIOACTIVITY TO THE ENVIRONMENT

The EIS directs the reader to reference NBEPC 1976 for details on critical pathways and demographic data required to calculate Derived Emission Limits (DRL) in order to understand the principles and methods of determining human exposure and the limits of release of radioactivity. Clearly, the 1976 document should be updated in the light of new standards and the new knowledge pertaining to the critical pathways. This information is extremely pertinent to the EIS, since it exposes the actual data base and assumptions to public scrutiny. A complete description of the radiological protection calculations should appear in this EIS rather than just being referenced.

1. Guideline 6.1.1 Radionuclides

> (1b) "the trajectory and dispersion of radioactive releases in the atmosphere and water taking into account weather and oceanographic conditions".

This issue was not addressed in any detail. A much more thorough treatment, based upon current scientific knowledge, would be both simple and valuable. Specific omissions include a discussion of the enhancement of the atmospheric plume of radioactivity owing to the installation of a second unit and the degree to which this enlarged plume will impinge on different downwind regions.

> (1d) "the probability of upset conditions that would result in a release of radionuclides and the level or (sic) radionuclides that would be expected for such events".

DFO does not feel that enough description has been provided of the probabilities and associated consequences of "upset" conditions. While it is accepted that such information is most pertinent to the licensing authority (AECB), some effort should have been made to provide more detail in the EIS on the associated analysis of the environmental impacts. This omission from the report should be corrected.

> (1e) "the levels of radiation that could lead to a closure of food harvesting in the area and the likelihood that such an event will occur".

Although it could be inferred that information pertaining to this has been included, a direct consideration of this issue has not been included in the report nor have the criteria which would result in closure of food harvesting in the area been specified.

2. **Guideline 6.2 Impacts of Radiation on Humans**

(1a) Estimate...plant:

The discussion of this point appears to be lacking, although this is not the direct concern of Department of Fisheries and Oceans.

B. IMPACTS ON THE BIO-PHYSICAL ENVIRONMENT

In several cases the response to the issues specified in the "Guidelines for the Preparation of an Environmental Impact Statement" of January 1984 are inadequate. The issues that have been inadequately addressed are as follows:

1. **Item 6.1.4.**

While it is accepted that the use of chemical de-fouling agents for clearing the cooling water intake and pipework of biological growths is unlikely, the consequences of the use of chlorine or other chemical agent for such purposes should be evaluated, described and approved by the appropriate authorities, prior to their use.

2. **Items 6.1.5 and 6.1.6.**

The assessment of the effects of entrainment and impingement of organisms/populations has been made entirely on the basis of calculations based upon existing biological information pertaining to the area. No attempt has been made to estimate the magnitude of entrainment and impingement of organisms from information on the type and numbers of organisms affected during the operation of Lepreau I.

One wonders it this is because no such measurements have been made or, because such measurements exist but have been ignored? In either case, it does little to promote confidence in respect to a responsible approach to the monitoring requirements which should be addressed under sections 6.1.5.2 and 6.1.6.2.

C. MONITORING

1. The Guidelines clearly state that impact predictions were to be made and methods of assessing their validity addressed. The EIS states that radiation monitoring is on-going and we assume that the many experts involved in those programs are reasonably satisfied that their programs will achieve these goals.

2. The EIS advances the position that 'monitoring' is of little relevance to this development because the consequences of routine releases of radiosotopes are not generally detectable above background. While it is accepted that this may be true of most radioactive constituents released, it is clearly not the case for tritium, and in any event, takes no account of the value of routine surveillance as a mechanism for public reassurance.

3. Monitoring of the environment effects of entrainment, impingement, the thermal plume and chemical discharges, has been dismissed as futile. This discussion was based upon calculations of the expected impacts, the relationship of their magnitudes to those calculated for primary productivity and fish stocks, etc. in the Bay of Fundy, and upon the subsequent difficulty (impossibility?) of detecting the predicted changes as statistically significant ones caused by

aspects of this project. This approach, while plausible, still skirts the issue of how to verify predictions.

4. More effort could have been devoted to re-evaluating the contents of the EIS for Lepreau I and some of the reservations expressed with respect to it. A particularly good example of is the this method of estimating the thermal effects of the cooling water discharge. In the plume temperature model given on page 6-10, normally the area ("A") enclosed by a certain temperature excess (θ) isotherm, increases as the 3/2 power of the outfall discharge rate. Note however, that after a certain temperature ratio (θ/θ') has been reached the area calculated will decrease. This would indicate that as you increase the outfall temperature, the area becomes smaller - which is contradictory. Actual field sampling shows that at certain times of the year the plume from Pt. Lepreau I approaches that estimated for the two reactors. The plume modelling should be re-evaluated using the actual data from Lepreau I.

The proponent should adopt a more realistic attitude to the need for environmental surveillance or monitoring as a control procedure, albeit that the results of monitoring may be essentially 'negative' unless some unusual or unpredictable event occurs. This, would be a valid application of 'monitoring' in the sense implied in the Guidelines.

DETAILED COMMENTS

1. Heat Dissipation

pg. 6-1: "two dimensional numerical model .."- this model was never described in enough detail to evaluate its suitability (either here or in the 1976 MacLaren Report).

Figure 6-5: caption 'fully mixed' should be stratified. Lower latitude is 45°3.5' not 3.0'.

pg. 6-10: "maximum temperature rise is still within the" ...while technically correct, it is approaching those limits with only one unit operating and needs to be examined for two reactors using actual data from Lepreau I.

pg. 6-10: comments on the mathematical relation have already been made above. What is lacking is an adequate analysis of the sensitivity of the coefficients to ambient conditions. In addition, we find the following presentation is vague and confusing, i.e. even assuming that the model was useful in transforming plume parameters, the choice of parameters bears very little relationship to what might be encountered in a two unit operation, (when one can determine what parameters are being used.) The design cooling parameters are approximately:

30 m^3/sec with a temperature rise of 13° for a single unit and about 60 m^3/sec with the same ΔT for two units. These were the parameters used in the initial EIS studies for Lepreau I. It appears, however, that the operators of Lepreau I have adopted a pattern which results in a approximately constant outfall

temperature and variable flows.

Thus the parameters durig the September plume survey were very close to design and those during the April survey much different with a discharge of 16.7 m^3/sec and a temperature rise of 23°C. If the operators wish to maintain the constant outfall temperature during the operation of the second unit, then the discharge volume would simply be doubled. This we assume is the origin of the factor 2.8 (2) $^{3/2}$ given in the middle of page 6-13. Doubling the discharge factor increases the areal extent of an isotherm according to the $^{3}/_{2}$ power law given in the model. The various other parameter sets given in the text and on the diagrams do not seem to be appropriate for two unit operation under either reduced or full flow conditions.

It would be appropriate to develop a 'worst case' diagram equivalent to Figure 6-2. This would be probably low tide, stratified receiving waters, reduced flow, i.e. 33.4 m^3/sec at a temperature rise of 23°C. Using the April observations of the submerged plume and the enlargement factor of 2.8 the following very approximate results are obtained.

T	area
3°	21 ha
2°	61 ha

These results bear no resemblance to the figures given in table 6-1 for stratified, reduced flow, two unit operation.

In short, the similarity model doesn't seem to make sense, and neither does the choice of parameters in the majority of cases. Results are presented in a manner which makes it difficult to determine what parameters are being used. The unanticipated level of stratification encountered in the spring has resulted in reduced plume dissipation and the effect of this has not been evaluated properly for single unit operation let alone an additional unit.

pg. 6-22: Nothing is said about the possibility of thermal acute toxicity on phytoplankton as the water temperature is raised from 13°C to 23°C. Would not this thermal shock cause some mortality? Could this be important for zooplankton too?

pg. 6-42: This material states that spawning centers for the major finfish stocks appear to be remote and it implies that any spawning habitat that does exist near Lepreau would not be of concern because there's more elsewhere along the New Brunswick coast. This attitude is not acceptable to DFO whose mandate is to preserve Fish Habitat.

pg. 6-45: The section on impacts of sewage discharge is vague and does not appear to follow the guidelines. For example on page 6-47 the document states that "data on sewage flows or effluent concentrations of BOD and SS are not available for NB Power", the same section also states "effluent criteria are most likely being met". This puts the validity of the assessment into question.

2. Description of the Bio Physical Environment

pg. 3-7: The spring freshet from the Saint John River can be seen all the way to Grand Manan, not just a few km. The report itself discusses lower spring time salinities at Point Lepreau (6-9).

pg. 3-11: Shad migrate to the Bay of Fundy from as far away as Florida, not the Chesapeake.

pg. 3-12: Fisheries in the Bay of Fundy are managed by DFO (CAFSAC), not NAFO.

pg. 3-14: Nutrient limitation may also be important when stratification occurs.

pg. 3-39: "run for another five years". No decision has been formally reached on the duration of the Point Lepreau Environmental Monitoring Program (PLEMP) and this projection should be stricken from the text, both here and on pg. 8-3.

pg. 3-40: "The NB Power Program was more comprehensive than the BIO program in terms of the number and diversity of samples and analyses". The diversity of samples analysed in PLEMP was, in fact, greater than for the NB Power program.

pg. 3-41: "The following...Mn-54." Either eliminate this sentence or make it clear that these radionuclides were principally derived from the Chinese nuclear weapons test. The text gives the erroneous impression that normal background levels of these radionuclides are significant.

pg. 3-52: "With the exception of dulse, seafood contains no detectable radionuclides other than K-40." This kind of statement could be misleading. First of all, seafood should be defined. Secondly it should be emphasized that those radionuclides released from the Pt. Lepreau NGS are not present at detectable levels, but other radionuclides (P_o-210) are probably easily measurable. Finally, other organisms (mussels, clams, etc.) which qualify as "seafood" have been shown to contain detectable levels of Cs-137 and Co-60 by PLEMP.

pg. 3-53: "By October 1983, the only environmental measurements which could be traced...(August)." Tritium emissions from Pt. Lepreau NGS are easily measureable, both by PLEMP and by NB Power as opposed to "barely detectable" as indicated in the EIS. The operational H-3 concentrations of "0.4 Bq/m^3" should be compared to those pre-operational levels of PLEMP given in Figure 3-11 to illustrate how high above background the tritium levels actually are. This paragraph gives the very erroneous impression that tritium levels are "barely detectable" whereas, in reality, they are easily detectable by PLEMP outside the plant boundary and even more easily detectable by NB Power, inside the plant boundary.

pg. 3-54: Industrial pollutants are not necessarily stable. Various biochemical processes change speciation (and thereby toxicity) and promote degradation.

3. Monitoring

pg. 8-1: DFO strongly objects to the statement that a monitoring program must detect changes which are distinguishable from natural background to be effective. The prime purpose of a monitoring program is to check predictions made in the EIS, and to provide additional information for mitigation and for plant management. Obviously care should be taken to measure the right variables. The absence of measurable effects is a positive result which can help to confirm earlier predictions. Fisheries stocks may be too "noisy" to monitor effectively but other variables may provide useful information (see below).

"for example, ...impacts on fisheries stocks and background water quality will be negligible." The purpose of a monitoring program is to establish whether or not the effects are negligible. This is a chicken-egg type of argument to avoid considering the significance of a monitoring program. We think that the proponent could restrict themselves to saying that the present level of monitoring is sufficient. The proponent seems to be implying that even this level is not necessarily required. Further, the EIS ignores the possible impact of an accident or "upset conditions" which could have a very severe impact on "fisheries stocks and background water quality".

pg. 8-4: Impacts would be most visible in attached benthic animals. Earlier in the report it was suggested that the growth rate of Ascophyllum might increase due to warmer water. A monitoring program to test this and include other organisms could and should be mounted.

pg. 8-5: Under "worst case" conditions the effects on biological communities are likely to be great, not "small". These paragraphs are inadequate.

pg. 8-6: Since so much effort went into modelling the thermal plume, a monitoring program of water temperature is strongly recommended. This could be done partly by using remote sensing; for example IR photography from a low flying plane.

4. Releases of Radioactivity to the Environment

pg. 5-12: "Many of ...may rise to 20 times the present level." It is not clear where this figure of 20 times comes from; source of this estimate should be referenced.

pg. 5-17: "The levels produced from fallout are several orders of magnitude greater than the levels to be released from Lepreau I and II." This is an apples and oranges comparison. Different units apply to these two sources of radioactivity. This sentence should be omitted or correctly phrased.

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August 7, 1984 4359-6-1

Mr. R. J. Connolly
Co-Chairman
Lepreau 2 Environmental
Assessment Panel
Federal Environmental Assessment
Review Office
Ottawa, Ontario
K1A 0H3

Dear Mr. Connolly:

I am pleased to submit to you Environment Canada's review of the proposed Lepreau 2 project and its Environmental Impact Statement. I hope that the comments contained therein will contribute to the Panel's understanding of the project and will enhance your ability to fulfill your terms of reference.

Yours truly,

Clinton J. Edmonds, Ph.D., P.Eng.

RW/blh

enclosure

Canada

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REVIEW OF THE LEPREAU 2
ENVIRONMENTAL IMPACT STATEMENT

BY
ENVIRONMENT CANADA
AUGUST 6, 1984

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1.0 STATEMENT OF POSITION

We welcome the opportunity to advise the Lepreau 2 Environmental Assessment Review Panel on environmental protection measures for this new nuclear power station. The responsibility of Environment Canada is the preservation and enhancement of the quality of the natural environment. We wish to foster harmony between society and the environment for the benefit of present and future generations. This is accomplished, in part, through the prevention of unnecessary environmental degradation by various industrial sectors. The preservation of the environment around Lepreau 2 is an objective that we share with the proponent, other regulatory agencies, and the general public.

The New Brunswick Electric Power Commission has incorporated many sound environmental protection measures in the Lepreau 1 design. These measures relate to the cooling water system, the non-radioactive wastewater management system, and the sanitary waste treatment system. We recognize that Atomic Energy of Canada Limited are continuing research on the behaviour of various radionuclides in the environment and are developing and demonstrating various control technologies which reduce the release of radionuclides from CANDU stations.

Environment Canada suggests that the Panel give consideration to four points:

(1) opportunities do exist to improve the retention of certain radioactive materials at affordable costs;

(2) the groundwater monitoring system should be strengthened, additional information describing the hydrogeological flow regime at Point Lepreau provided, and contingency plans to prevent the spread of groundwater contamination developed;

(3) a separate account should be established to cover decommissioning costs; and

(4) subsequent costs of fuel disposal should be supported by consumers of the electricity.

Our suggestions are consistent with the department's policies on the better management of toxic chemicals and are premised on our position that wastes released by any industry should be limited to the lowest level that is reasonably achievable.

Technology and understanding have both advanced since Lepreau 1 was designed. While the commitment of government and industry to a clean environment remains unchanged, we believe that the expression of that commitment can be strengthened by certain design differences between Lepreau 1 and 2, differences that would provide for better management of radionuclide discharges and other wastes during the normal operating life of the station.

The opportunities for improvements in controls that we suggest for consideration by the Panel are a radioactive liquid waste treatment system, a carbon-14 emission control system, a more effective noble gas emission control system and design provisions for a tritium removal system. The liquid waste treatment technologies that we discuss for the 40 year operating life of the station are, in fact, proposed by Maritime Nuclear during the decommissioning phase. In addition, the control of noble gas emissions is common in more recent nuclear power plants, and the control of carbon-14 emissions has been under investigation for CANDU stations in recent years.

While we recognize that extensive measures are taken to isolate the reactor complex and the low-level solid waste management facility from the water table, the monitoring plan proposed is inadequate to detect groundwater contamination on-site if one or more of the designed controls should fail. Seepage control from non-radioactive waste treatment and disposal facilities cannot be evaluated on the basis of the information we presently have. We understand, additionally, that the hydrogeological regime at Point Lepreau is not well enough known to predict the movement of contaminated groundwater.

The financial provisions established to cover decommissioning costs may, in the eventuality, result in a charge to succeeding generations of Canadians. We believe that the costs of decommissioning should be paid for by those who use the electricity, and therefore recommend that a separate account, such as a sinking fund, should be established during the life of the reactor.

Selection of a site and development of a national repository for used fuel are becoming increasingly urgent. The industry's share of research costs in the joint fuel waste management program, noted in the EIS, and the subsequent costs of fuel disposal should also be supported by consumers of the electricity from Lepreau 2. These matters were addressed by the National Energy Board in the case of Lepreau 1, but warrant further support by this Panel.

The Panel established for Lepreau 1 recommended that an environmental monitoring program should be initiated. A comprehensive program has been in existence since 1979. Given that this reactor represents a doubling of capacity and that there are gaps in our knowledge on the effects and behaviour of radionuclides in the marine environment, we recommend that the environmental monitoring program should continue.

The costs of our suggestions for the preservation of environmental quality are small in comparison to the cost of the Lepreau 2 project. They are in the order of 13 million dollars, about 1.5 per cent of the capital cost of the project. Because of these measures, quantifiable economic benefits would accrue to industries involved with design, construction and operation of the facility. More importantly, these environmental measures would contribute to the preservation of the environment impacted by the project, for present and future generations. These benefits cannot be readily expressed in purely economic terms.

More detailed discussion, conclusions and recommendations are presented elsewhere in the submission. In order to assure that the environment is adequately protected we also need to know the answers to the question listed in Section 5 of the submission.

2.0 INTRODUCTION

The approach taken for this document was to review the project through information in the EIS, in referenced material obtained from Maritime Nuclear, in additional material, and knowledge of site conditions. The following sections review the environmental protection measures proposed, and outline questions which we would like the proponent to address at or before the public hearings. Conclusions and recommendations are presented.

At the Panel's scoping workshop, the department provided a list of 18 concerns on which we requested information; one was determined to be outside the Panel's terms of reference. These concerns have been variously addressed by the EIS, some well, others not at all. Inevitably, however, reviewers have identified deficiencies in the EIS compared to the Panel's guidelines, and we have attached these as Appendix A. The list presented there should not be considered complete.

We now offer comments on: the discharge of radioactive wastewaters and air emissions, dispersion of these emissions, groundwater, design of the cooling water system, waste collection and disposal, shellfish contamination, decommissioning, monitoring and research. Environment Canada has not addressed several issues related to the intake and discharge of cooling water: entrainment of biota, impingement, thermally and mechanically induced mortality, and verification and impact of the thermal plume. In these areas, we defer to the expertise of the Department of Fisheries and Oceans.

Introductions are traditionally the place to make miscellaneous remarks, and we have two more. The ongoing debate about what level of detail to provide to an environmental assessment panel is illuminated a bit more by the Lepreau 2 EIS. In trying to find a balance between adequate detail and a report of readable length, Maritime Nuclear has achieved what appears to be a reasonable compromise. Departmental reviewers sometimes experienced time pressures, however, because of the practice of including relevant detail in material which is only referenced in the EIS. It was not always possible for reviewers to obtain reference documents or explore these areas as completely as they wished in time to meet internal deadlines. Paradoxically, it would appear that the time needed to review such a relatively brief EIS is no shorter than what might be needed to review a more complex one.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

(1) The information available and monitoring proposed for groundwater are inadequate to assure its protection.

(2) Much of the information relating to environmental protection measures and derived emission limits was developed for Lepreau 1.

(3) Since the environmental impact assessment was conducted for Lepreau 1, a considerable amount of additional scientific knowledge has evolved on the behaviour of radionuclides in the environment. This includes information on carbon-14, iodine-129, krypton-85, bioaccumulation factors, conventions for radiation dose limits, etc.

(4) Since the design of Lepreau 1, considerable technological advances have been made to reduce radionuclide releases from nuclear stations. These developments have included treatment technologies to eliminate discharges of non-volatile radionuclides in the liquid phase, and to reduce noble gas and carbon-14 emissions.

(5) The derived emission limits presented in the EIS are outdated due to the existence of new monitoring data, new models and proposed new calculation procedures.

(6) From information provided in the EIS, it appears that the existing once-through cooling system design fully complies with what Environment Canada considers to be appropriate environmental protection measures.

(7) Information in the EIS indicates that the Lepreau 2 design fully complies with many wastewater management practices which we consider appropriate. These practices include non-radioactive wastewater treatment and sewage treatment.

(8) With relatively minor modifications and provisions, the Lepreau 2 design could comply with other recommended practices. These include groundwater monitoring and protection.

(9) It appears that state of the art technologies are intended for the control of particulate, radio-iodine and tritium emissions.

(10) The proponent has not addressed the release of radionuclides during accident or upset conditions.

3.2 Recommendations

(1) The groundwater monitoring system needs to be strengthened and a field program needs to be undertaken to determine the flow of groundwater movement. This information will support the necessary development of contingency plans to prevent the spread of contaminated groundwater.

(2) We recognize that Lepreau 2 will meet release limits established by the Atomic Energy Control Board. However, consideration could be given by the Panel to opportunities to further reduce emissions of radioactive liquid wastes, carbon-14 and noble gases.

(3) We also wish to draw to the Panel's attention the opportunity to make provisions for the future installation of a tritium removal system.

(4) Changes to the proponent's monitoring program should be considered, taking into account the suggestions made on page 25 of this document.

(5) The performance of the existing non-radioactive liquid waste treatment system should be examined and any necessary modifications should be made.

(6) The performance of the existing sewage treatment plant should be examined and any necessary modifications should be made.

(7) Provisions for decommissioning should be in place to the extent practicable during the design and operations phase.

(8) Oil-heat exchangers should be included in the recirculating auxiliary cooling water loop.

(9) A separate account, such as a sinking fund, should be established to receive monies allocated for decommissioning.

(10) Provisions should be made to ensure that consumers of the electricity from Lepreau 2 pay a share of the research costs in the joint government-industry high level waste program. Consumers should also be charged the total estimated costs of transportation, immobilization and disposal of the used fuel.

4.0 SPECIFIC ISSUES

The primary concern of Environment Canada in this review has been to determine whether the design, construction, operation and decommissioning of a second power reactor at Point Lepreau have been planned in a way that reasonably preserves the existing level of environmental quality.

4.1 Opportunities for Additional Controls

Our normal approach to the control of pollution from industry is based on containment of environmental contaminants at their source. We note that the proponent is committed to preventing unnecessary radiation exposure and concurs with the International Commission on Radiological Protection's (ICRP) recommendation to prevent unnecessary radiation exposure and to keep all necessary exposure "as low as reasonably achievable" (ALARA).

For nuclear stations, preventative measures are continually being developed and applied to control radioactive releases to water and to air. Radionuclide releases to water (excluding tritium) can be virtually eliminated. Technologies are also available to reduce carbon-14 and noble gas air emissions. The controls for particulate and radio-iodine emissions intended by Maritime Nuclear appear to be state-of-the-art.

Radiation effects on humans are fairly well understood. However, the effects of radionuclides on the environment are less well understood. Over 200 different radionuclides are produced in nuclear stations. Further research is warranted on the long-term effects of radionuclides on phytoplankton, zooplankton, benthic communities, fish in various life stages, trees, vegetation and wildlife.

The benefits of additional controls in terms of the prevention of cancers and genetic defects in humans are minimal. However, the cost of incorporating the pollution control technologies discussed is also minimal in comparison to the $1 billion capital cost of Lepreau 2. The total capital cost of the environmental controls discussed below is about 13 million dollars, or less than 1.5 percent of the capital cost of the project. Quantifiable economic benefits would accrue to industries involved in the design, construction and operation of Lepreau 2, and the preservation of environmental quality for this and future generations would be enhanced.

Several years have passed since Lepreau 1 was designed. In the intervening period, knowledge and control technologies have both advanced. New problems have emerged and new solutions have been devised. Yet, in many respects, the EIS is frozen in time at the point when Lepreau 1 was being designed. The technology and concerns described for Lepreau 2 are essentially those established for the original unit. Thus it is our understanding of recent developments in knowledge and technology, our mandate for the preservation and enhancement of environmental quality, and our shared objective that lead us to the following observations.

4.2 Discharge of Radioactive Wastewaters

Wastewater Treatment System

No treatment facilities dedicated solely to the treatment of radioactive wastewaters are intended during the 40 year operating life of Lepreau 2. An assessment of economically available radioactive wastewater treatment technologies indicates that the radioactivity of plant wastewaters can be readily reduced by factors of over a million.

Current technologies, which are capable of achieving 100 Bq/L, gross beta, include the use of mechanical evaporators. These are widely used in nuclear stations in the United States, Japan and Europe. Atomic Energy of Canada Limited (AECL) have developed and demonstrated an evaporator/solidification system at Chalk River Nuclear Laboratories and the Douglas Point nuclear generating station. In fact, the proponent intends to use a mechanical evaporator wastewater treatment system during the decommissioning of Lepreau 2, so that essentially no radioactive liquid effluent is released to the environment at that time.

Consideration could be given to the installation of a state-of-the-art wastewater system for the treatment of non-volatile radionuclides during the operational life of Lepreau 2. A wastewater discharge criterion of maximum 100 Bq/L, gross beta, is considered to be a reasonably achievable design objective and operating target. The capital cost of this system would be in the order of $5 million (1983), and the operating and maintenance costs would be in the order of $1 million per year.

Tritium Removal

In the second paragraph of page 5-5, the statement is made that "tritium ... does not concentrate in the environment." While tritium will not bioconcentrate, the U.S. Environmental Protection Agency has predicted that increases of tritium in water in the Great Lakes will take place, due mainly to the operation of CANDU reactors (R.E. Sullivan and W.H. Ellett. "Effect of Nuclear Power Generation on Water Quality in the Great Lakes". U.S.E.P.A. Office of Radiation Programs ORP/CSD-77-5. 1977). The major source is projected to be washout from aerial emissions and tritium releases direct to water and, in fact, tritium concentrations above the background level have been measured near Lepreau in air samples taken by the Department of Fisheries and Oceans as well as by NBEPC. These observations point out the desirability of examining control options.

The control of tritium releases to the aquatic environment is more complex than the treatment of non-volatile radionuclides. Because of the expense of heavy water, extensive design and operational efforts are made to conserve the heavy water inventory within the station, thus minimizing the releases of tritiated heavy and light water. Provisions are made to minimize leaks in heavy water systems, and to segregate, collect and upgrade heavy water leaks. As the station ages, however, tritium levels will increase greatly, particularly in the moderator system. Thus, for any leak rate, tritium release will increase during the operating life of the station. A tritium removal system (TRS) could be used to reduce the tritium in heavy water systems, and the proponent indicates that this system may be used during decommissioning of the station.

Examination of tritium releases from CANDU stations indicates that a design and operating target of $1500 \times 10^{+12}$ Bq/y would be reasonably achievable for Lepreau 2 towards the end of its operating life. This target would entail careful heavy water management and the use of an intermediate auxiliary cooling loop, as is planned for Lepreau 2.

Consideration could be given to making design provisions for the installation of a tritium removal system at Lepreau 2 in the future. Although the capital cost of this system is high ($70 million, 1983), and the technology is complex (cryogenic distillation) the operating cost may be offset by sale of tritium ($10 million/kg) for the international fusion program. Another alternative would be for the proponent to transport heavy water to Ontario for tritium removal.

4.3 Release of Radioactive Air Emissions

A review of the limited information provided in the EIS, and an assessment of available air pollution control technologies for CANDU systems, indicate that state-of-the-art equipment is intended for particulate control (high efficiency particulate air (HEPA) filters), for radio-iodines (activated charcoal filters) and for tritium (driers and heavy water recovery).

Carbon-14, iodine-129 and krypton-85 are not specifically mentioned. These long-lived radionuclides have half-lives and residence times in the atmosphere and hydrosphere sufficiently long for transport and distribution over the globe (Nuclear Energy Agency, "Radiological Significance and Management of Tritium, Carbon-14, Krypton-85, Iodine-129 Arising from the Nuclear Fuel Cycle", NEA Group of Experts, OECD, April 1980). A brief review of the available technologies for carbon-14 and noble gas control is presented in the following.

Carbon-14

The EIS does not mention the presence or the possible control of carbon-14. A major source of carbon-14 in one CANDU system was nitrogen used as the annulus gas. Presumably carbon dioxide will be used as the annulus gas for Lepreau 2 so that the annulus gas will not be a significant source of carbon-14. Carbon-14 is also formed from oxygen-17, which is enriched during the process of producing heavy water. The moderator cover gas is thus a major source of carbon-14. It is usual to have a recombiner system for this gas (to recombine hydrolized hydrogen and oxygen) and it would be relatively simple to include a solid absorber (such as calcium hydroxide) to remove carbon-14. Carbon-14 in the liquid state will be removed by the heavy water ion exchange purifiers.

Carbon-14 build-up has been found in trees near a CANDU station. It is also of possible global concern due to its long half life (5730 years) and mobility in the ecosystem. The opportunity to minimize carbon-14 emissions from Lepreau 2 should be examined. The system just described has a cost in the order of $0.25 million (1984).

Noble Gases

While emission of noble gases (and other fission products) will depend on the integrity of fuel bundles, the provision of an off-gas treatment system to treat the vented noble gases from various sources within the station would minimize their release to the environment. Sources include the primary heat transport (PHT) heavy water collection tank, PHT storage tank, the fuelling machine head, fuel transfer chamber and the degasser condenser. A treatment system could consist of activated charcoal delay beds operating at ambient temperature (R.J. Tosetti. "Gaseous Waste Treatment". ASME Radioactive Waste Management Course, Alexandria, Va. May, 1984). The preliminary results from a computer model that predicts the performance of various air emission control systems (CANDEL) indicates that noble gas releases can be reduced by a factor of 30, from 312 x 10^{+12} Bq/y to 10 x 10^{+12} Bq/y, by using the above systems. The limited data presented in Table 5-4 (page 5-13) indicate that noble gas emissions may be the highest percent of DELs.

The capital cost of the system described is approximately $8 million (1984), and the operating and maintenance costs are probably in the order of $1 million per year.

4.4 Disperson of Atmospheric and Liquid Emissions

The Panel's guidelines ask that the proponent describe "the trajectory and dispersion of radioactive releases in the atmosphere ... taking into account weather conditions". This does not seem to have been attempted in the EIS.

The small section on Climate (Section 3.1.3., pages 3-4 and 3-5) gives some data but draws no conclusions from the data, nor does it relate the meteorology of the area to deposition or dispersion of radionuclides. Furthermore, the time periods over which the average meteorological conditions were determined are not indicated and neither are the locations of the weather stations from which the data were obtained.

A check of the Atmospheric Environment Service "Temperature and Precipitation Normals" for Saint John Airport for 1951-80 shows that the temperature and precipitation values given in the report for Lepreau are actually those for the airport. There are differences in the values between the two sites, as discussed in the Lepreau 1 environmental assessment ("Environmental Assessment for the Point Lepreau Generating Station", N.B. Electric Power Commission, March 1977). Data on temperature and precipitation have been collected at Lepreau over the last few years, but were not presented in the EIS.

The wind data presented in the Climate section apparently came from the Lepreau 1 document. The 12 year period referred to is 1939-1951 and the site must be the old Point Lepreau site on the tip of the point. It appears that there was no attempt to use more modern wind data, such as those obtained from the generating station site.

The statement that "seventy per cent of the time (the winds) were from land to water" is not correct, but may have been derived from the false assumption that the centre of the wind rose on Fig. 4.7.1 of the Lepreau 1 document marks the wind observing site. Winds from land to water at the tip of the Point (i.e., NW, N, NE winds) amount to less than 40 percent of the time.

The source and time period for the tropical cyclone information are not indicated; however, the information was probably derived from statistics produced by the American Weather Service for the 90 year period 1886 through 1975. Sixteen of the 62 tropical cyclones had hurricane force winds (equal to or greater than 64 knots or 118.5 km/h) at some time during their passage over Nova Scotia or New Brunswick. This total is many times more than the total of three given in the EIS.

The STAR stability program that produced the Saint John stability estimates (reported in the Lepreau 1 document) is probably not reliable for a coastal location. The presence of the Bay of Fundy will produce coastal inversions (stable conditions that trap emissions in the lower air) when the water is colder than the land (spring through fall) with an onshore wind, and land and sea breezes will develop due to the land/water temperature contrast throughout the year.

We believe that the mixing height, wind speed and ventilation coefficients at Point Lepreau probably follow the same general trend as at Sable Island. Due to the influence of the cold ocean water during the summer, one would expect low mixing heights and low ventilation coefficients during this season and higher values during winter. The wind speed is generally higher in the winter as well.

The calculation of DELs in the EIS for Lepreau 1 (pages 9 and 10) assumed that the dispersions of released materials could be described simplistically using a weighted mean dilution factor (symbolized by Ka) which was reported by Bryant (1964). For the Lepreau 2 EIS, the proponent does not evaluate the applicability or the adequacy of Bryant's work in the light of 20 years of progress in dispersion studies and model development. We have recalculated dispersion on the basis of a more widely used model (D.B. Turner, 1967. Workbook of Atmospheric Dispersion Estimates. U.S. Dept. Health, Education & Welfare) using data from the 1976 DEL report referenced in the EIS. While our calculations confirm that Bryant's model produces more conservative numbers, NBEPC's calculations have been done by extrapolating instantaneous (1 second) concentrations to a one-week period. This is not accepted practice due to the wide short-term fluctuations normally experienced.

The statement about the derivation of particulate DELs (page 5-6) is very vague. Bryant's model describes only gaseous dispersion, and we do not know how the particulate DELs, which would have to be based in part on deposition velocities, were calculated. We are also concerned about downwash of aerial emissions near the plant, given the similarity in elevation between the stack exit and the height of the adjacent reactor building. Bryant's model does not begin calculations until 100 m away from the stack.

In summary, the site derived emission limits (DELs) presented in the EIS are those calculated to obtain approval for Lepreau 1. More up-to-date monitoring data and more accepted atmospheric dispersion models are now readily available. When combined with changes in the radiation equivalent dose limits proposed by the Atomic Energy Control Board, and changes proposed to the DEL calculation procedures by the Canadian Standards Association and the Canadian Nuclear Association, these factors indicate that the site DELs presented do not reflect current knowledge.

4.5 Groundwater

We believe that knowledge and monitoring of the groundwater regime at Point Lepreau needs to be improved. Figure 3.6 shows that NBEPC monitors eight well water supplies on the Lepreau penninsula, but none of these are on the plant site. The Point Lepreau Environmental Monitoring Program, coordinated by the Department of Fisheries and Oceans, does not sample groundwater. The most recent report by NBEPC on the Commission's monitoring program (J.K. Sutherland et al. "Environmental Radiation Monitoring Data for Point Lepreau Generating Station, January 1, 1983 to December 31, 1983". Report HP-07000-84-1. February, 1984) indicates that two boreholes have been placed on the site of the solid radioactive waste management facility, and that levels of tritium apparently above background were found in samples taken in the third quarter of 1983.

From our present understanding, information obtained from these boreholes and the wells indicated in the EIS represents the total state of knowledge of groundwater on the Lepreau penninsula. Besides the solid radioactive waste management facility, the potential sites at which groundwater contamination could occur if seepage control systems were to fail will include the reactor complex and irradiated fuel storage bays, the non-radioactive waste treatment facility and the sludge storage lagoon.

The monitoring program for groundwater appears to be inadequate. Although the rate of groundwater movement at Lepreau does not appear to be known, contamination would be extensive by the time it was detected in domestic wells, the closest of which is about a kilometer from the station. Detection would be late and cleanup measures would be almost impossible.

A basic principle for the selection, design and operation of waste storage sites is that groundwater quality should be protected. In the EIS, no details are provided to describe how stored waste is isolated from the groundwater environment. No details are provided on the nature of the impervious liners used for the non-radioactive waste treatment and sludge disposal sites, but our experience with similar systems elsewhere indicates that some of these barriers can best be described as temporary.

Response to an upset resulting in groundwater contamination or a failure of designed seepage controls would be seriously hampered by the apparent lack of knowledge as to the movement of groundwater near the station. This situation should be corrected.

We recommend strengthening the monitoring program through development of additional monitoring wells and the immediate undertaking of a field program that will enable groundwater movement to be predicted. We also recommend the development of contingency plans to deal with an event in which groundwater became contaminated.

4.6 Design of the Cooling Water System

In general, the design of the cooling water system represents the state-of-the-art.

The intermediate cooling loop between the moderator and other heat exchangers will prevent the inadvertent movement of tritiated heavy water into the once-through cooling water environment. However, the direct cooling of oil-heat exchangers may result in contamination of the environment, with oil, in the event of heat exchanger leaks. For Lepreau 2 it is suggested that the relatively small oil heat exchangers be incorporated in the recirculating service water system (page 2-23, Fig. 2-9).

4.7 Waste Collection and Disposal

The sludge and refuse disposal sites should be developed in modular fashion, and contoured, capped and reclaimed prior to abandonment. No details are given as to whether decant water from the sludge disposal site will be monitored and possibly treated before discharge.

Liquid Segregation and Containment

Collection and containment of similar wastewaters is provided (oily wastes, chemical wastes, sanitary wastes, radioactive wastes). In addition it is believed that separate containments are provided around acid and caustic tanks in the water treatment plant and around indoor equipment with dielectric and fire resistant fluids. Containment provisions for outdoor transformers, diesel fuel tanks and waste disposal sites are not described.

Containment Sizings

Although few details are provided, it is believed that neutralization, sedimentation, oil separation, (Fig. 6-13 page 6-46) and radioactive liquid waste containment facilities are conservatively sized. Operating experience would verify that they are adequately sized for 24 hour volumes and/or for maximum leaks and spills that could be reasonably expected. Allowances for a 100-year, 24-hour precipitation event for outdoor containments might be considered. Such facilities would include the sedimentation lagoons and waste disposal sites.

Discharge of Non-Radioactive Wastewaters

We note that the legally required non-radioactive effluent criteria (page 6-52) stipulated by Environment New Brunswick (ENB) are generally more stringent than those proposed by Environment Canada.

Parameter	New Brunswick Environment (Permit) 30 day Average	Instantaneous	Environment Canada (Proposed) Average
pH	6.0 - 9.0	5.0 - 10.0	6.5 - 9.5
Suspended Solids (mg/L)	20	40	25
Oil & Grease (mg/L)	10	20	15
Iron	-	-	1.0
Copper, Chromium	-	-	-
Nickel, Zinc	-	-	0.5

It is assumed that no significant metal concentrations have been found during normal plant operations.

The design provisions for non-radioactive wastewater treatment at Lepreau are considered state-of-the-art, although the system performance should be optimized in terms of effluent suspended solids.

4.8 Shellfish Contamination

The prediction that plant sewage will not impact shellfish is noted. We do not, however, agree with the statement (page 6-50) that concentrations at the point of effluent discharge would drop to levels below those specified for shellfish area closure in 24 hours. The discharge of sewage is continuous, though presumably subject to diurnal variation, thus die-off over a 24 hour period will not have a net effect on the concentration of fecal coliform bacteria at the point of effluent discharge. The sewage treatment plant (STP) is equipped with a hypochlorinator. Satisfactory operation of this equipment would minimize concerns for the quality of the sanitary effluent.

Although the STP is a state-of-the-art facility, its actual performance should be periodically examined. The EIS suggests (page 8-7) that a regular monitoring program is not in place at present; this is of concern because regular monitoring and maintenance are essential to the proper operation of this type of equipment. The STP is probably under-loaded at the present time. Effluent quality could be expected to improve when the loading is increased with the addition of sewage from Lepreau 2.

4.9 Decommissioning

We concur that actual CANDU decommissioning experience may be available by the time Lepreau 2 is decommissioned. Gentilly I and Douglas Point will provide this experience if they are fully decommissioned before the end of Lepreau 2's 40 year operating life, and if the 120 year decay scenario (page B-9) is not used for these stations. However it is evident that extensive research, development, demonstration and practical experience are required to refine decommissioning technologies and practices. While it may be "to some extent unrealistic to make commercial decisions many years ahead of when they are actually needed", there has been relatively recent recognition of the need to make adequate financial provisions for decommissioning. In addition, appropriate technical provisions and planning should be made during the design and operational phases of the station. As with disposal of irradiated fuel and high level wastes, there will probably emerge many technical and social issues that are currently not fully appreciated.

Technical Aspects of Decommissioning

(1) The need for a low level and high level waste disposal site is underscored (pages B-4, B-5, B-6).

(2) Provisions may have to be made to store irradiated core components (such as pressure tubes) at the station low level waste storage site.

(3) We question the practicality of waiting 120 years after shutdown (page B-9).

(4) We question allusions to radioactivity decaying to background levels (pages B-19, B-21). Long-lived radionuclides will remain active for thousands of years. Examples of these radionuclides are:

Niobium-94	half-life - 2×10^{4}
Zirconium-93	half-life - 1.5×10^{6}
Nickel-59	half-life - 8×10^{4}

(5) We question using only storage of tritiated heavy water for decay (page B-13). After 40 years the tritium concentration in the moderator heavy water circuit will be $2 \times 10^{+12}$ Bq/kg. After 12.3 years this will decay by half but it will be many years before it decays to background levels.

(6) Ion exchange and filtration for decontamination are proposed (page B-14). We note the use of evaporative techniques to concentrate liquid wastes and solidify residue (page B-15). The distillate will be very low in radioactivity (except for volatiles such as tritium or ruthenium).

(7) No mention is made of the decommissioning, disposal, re-use and monitoring of non-radioactive wastes. These may include PCBs, fire-resistant fluids, process chemicals, water and wastewater treatment sludges, oils, etc.

Financial Provisions for Decommissioning

Experience in the Maritimes, as elsewhere, with the mining industry has led to federal and provincial support for the concept of performance bonding. It is undertaken as a means of ensuring that company resources are available to deal with the substantial decommissioning and reclamation costs associated with the decision to close an active mining site. The rationale for the bonding presently in place in New Brunswick and Nova Scotia is based on experience gained in dealing with environmental problems encountered years after a site had been closed, and the financial insolvency of an operator.

In its approval for Lepreau 1, the National Energy Board (NEB) required NBEPC to collect a levy on power sold, to provide assistance in the joint research effort to develop a radioactive waste disposal facility in Canada. The Board also required a levy to provide against the eventual costs of decommissioning.

NBEPC presently makes financial provision for the eventual costs of decommissioning and irradiated fuel disposal at Lepreau 1 (NBEPC Annual Report, 1983). In its annual report, the Commmission has estimated that decommissioning Lepreau 1 will cost $72 million. To cover decommissioning, it has set an annual charge of $300,000, an amount that would accumulate to $72 million if compounded annually at 12% over 30 years. It may be assumed that a similar procedure would be developed for Lepreau 2, although the actual sum involved may well be higher.

According to its annual report, NBEPC intends to periodically revise the total estimated decommissioning cost and the amount created annually as a deferred liability; presumably such a revision will counter the eroding value of the initial estimate and reflect changes in understanding and technology. We wish to point out, however, the likely consequence of the present practice of deferring the decommissioning cost as a future liability without creating a special offsetting asset such as a sinking fund.

The levies for decommissioning and irradiated fuel disposal, referred to above, are in practice being taken into general revenue. At the time when Lepreau 1 is decommissioned, NBEPC will thus have to realize a deferred liability of at least $72 million in 1983 dollars. The likely sources of this amount would entail a decrease in assets or an increase in long term debt, depending on the nature of the Commission's assets and its profitability in the years preceding. If the cost of decommissioning could not desirably be recovered from assets, so that long term borrowing were necessary, the effect would be to pass on a charge to succeeding generations of Canadians.

For Lepreau 2, we recommend a separate account, such as a sinking fund, to receive monies allocated for decommissioning. We also recommend that adequate financial provisions be made to provide for used fuel disposal and to support the associated research program.

4.10 **Monitoring and Research**

In-Plant Monitoring

Radiation monitoring within the plant will be governed by requirements of the AECB.

While facilities for representative sampling of the active waste discharges appear to be provided, no details are provided on the sampling, pH and flow monitoring of the non-radioactive liquid waste discharges.

At least three radionuclides of concern are apparently not monitored in atmospheric releases from Lepreau 1: carbon-14, krypton-85 and iodine-129. While analytical difficulties may preclude frequent measurement, we suggest that this aspect of the monitoring program should be re-evaluated for Lepreau 2.

Environmental Data

The comprehensive recording and reporting procedure in place for Lepreau 1 is an example of state-of-the-art environmental monitoring. We note, however, that the action guides presented in Appendix E are keyed to water samples and food samples as well as to stack and effluent releases, but the levels at which action will be taken based on environmental data are not given.

Some aspects of the proponent's monitoring program do not appear adequate. Besides the groundwater program suggested earlier, suggested additions are:

(1) Surface water at non-radioactive waste disposal sites.
(2) Sewage treatment plant effluent.
(3) Biota and sediment at Indian Cove.
(4) Tritium and other radionuclides in terrestrial samples.
(5) Carbon-14 in trees.

Two further points need to be made with respect to monitoring and research. The program of research coordinated by the Department of Fisheries and Oceans, while properly a function of government, fulfills some of the needs for post-operational environmental monitoring that would, in the absence of such a program, be the proponent's responsibility. While an endpoint for the research program has not been given, we believe that the proponent should provide assurance that critical non-human pathways will be monitored if the government's program is discontinued.

Secondly, we wish to draw attention to the need to renew, for Lepreau 2, the surcharge placed on Lepreau 1 to develop long term solutions for the disposal of radioactive wastes in Canada. As pointed out in the section above, the information in the EIS reinforces the need to proceed expeditiously with the Canadian Nuclear Fuel Waste Management Program. The site selection and development of a disposal repository for used fuel and decommissioning wastes is becoming an issue of increasing urgency.

5.0 QUESTIONS ARISING FROM THE EIS

The opinion of reviewers within Environment Canada is that, except for the area of groundwater information, we have enough information to enable review of most aspects of the project. Nevertheless, the absence of specifics impairs our assurance that the environment will be adequately protected. Accordingly, we would like the proponent to address the following questions at or before the public hearings.

Page 2-18. The EIS describes a leak collection and monitoring system between the double concrete walls of the used fuel bays. At Lepreau 1, has this system detected anything to date?

Page 2-32. The EIS indicates that additional used fuel bays may be built if required. Government has recently announced that a used fuel disposal facility will be ready within 16 years. Will blasting for additional pools and canal facilities cause any risk to existing structures or equipment?

Page 2-33. The EIS indicates a design level of 25 uSv/h outside the vaults of the low level waste facility. Will this level be maintained for all anticipated wastes stored at the facility? For example, will it be maintained if irradiated core components such as damaged pressure tubes are stored?

Page 2-35. The EIS states "if the sample of the tank contents indicates an activity higher than permissible, the contents can be held until the activity decays sufficiently...". What is the permissible level of activity for the tank contents to be discharged to the condenser cooling water? The confusion arises as a result of two categories of liquid wastes, viz., low activity wastes that have a maximum gamma activity limited to 1 kBq/L, and normal activity wastes that have a maximum gamma activity of 1 MBq/L.

Page 2-51. The EIS states that oily waste sludges will be removed periodically by a private contractor. How will these sludges ultimately be disposed of?

Page 2-55. The provision for chlorination is noted. It is further noted that mechanical cleaning of heat exchangers has, to date, proven satisfactory. Will on-line mechanical cleaning of heat exchangers other than the condensers be used?

It is recognized that the titanium condenser tubes are highly corrosion resistant. Will cathodic protection systems be used in other parts of the seawater circuits to prevent galvanic corrosion? Are these systems impressed current types or sacrificial anode types? Are zinc or other sacrificial anodes planned?

Page 2-58. How will seepage from the non-radioactive liquid waste treatment facility be monitored and controlled?

Page 2-59. No description of environmental concerns associated with the pickling process for mild steel is given. Where will the operation take place? How will the wastes be treated in Ontario?

Page 2-60. Spill containment facilities are part of normal design practice but are not discussed. Will they be included around outdoor transformers, fuel tanks and waste disposal sites?

Page 2-61. An on-site sludge pond will receive solid non-radioactive wastes, including sewage and chemical sludges. A conceptual design emphasizing environmental controls should be provided for evaluation. How big is the lagoon and what is the rate of sludge generation from both units? How will seepage and runoff from the disposal area be monitored and controlled?

Page 3-2. Although there is no visible evidence of surface displacement in the area, this does not preclude the possibility of significant ground shaking. Point Lepreau lies in a zone characterized by a broad, diffuse cluster of earthquakes (Richter magnitude M less than 6) which appear to occur randomly throughout this zone (because the causative tectonics are not understood). Several moderate tremors (M = 5-6) are known to have caused isolated building damage. Prediction of earthquake location is not presently possible in this zone because the recent seismic activity is believed to be related to a deeper subsurface fault system which has not been located. The EIS states that the reactor building and one independent safety system will withstand a major earthquake. Is the major earthquake referred to in the EIS one of magnitude at least 6? Did the update referred to in section 3.2 result in reconsideration of the design for Lepreau 2? Has any damage been noted at Lepreau 1 that may have been caused by ground motion?

Pages 5-13 and 5-14. Although the normal release rates are small fractions of DEL limits, during an upset and subsequent cleanup would maximum permissible rates of release be utilized to minimize cleanup requirements?

Page 6-44. We have not been able to evaluate the three proprietary chemicals used in the water treatment plant. What are the product safety characteristics of Dearborn 6400, Dearborn 3632 and Dearborn 431?

Page 6-45. Is effluent from the non-radioactive waste treatment facility checked periodically for substances not specified in the discharge limits and, if so, with what results?

Page B-31. The Ontario Hydro study for decommissioning costs is not referenced (page B-31). What is the total estimated cost for decommissioning Lepreau 2 in current dollars?

Page E-14. Appendix E indicates action guides based in part on environmental data. What level of activity in water samples would curtail the consumption or sale of seafood? What level of activity in food samples would curtail use of all food pathways?

APPENDIX A

DEFICIENCIES WITH RESPECT TO THE PANEL'S GUIDELINES

4 The Proposed Project (page A-5)

Construction phases and schedules have not been presented.

4.1 Plant Design and Operation (page A-5, A-6)

Specific changes in design or operating procedures were not identified.

For the description of radioactive air emission control systems, adequate details of in-plant sources and system schematics were not provided.

The adequacy of effluent control systems (air, water) for abnormal conditions was not assessed.

5. Approach to Assessment (page A-7)

The uncertainty of predicted changes due to releases of radionuclides to the aquatic environment has not been acknowledged.

6.1 Impacts of Radionuclides (page A-8, A-9)

The impacts (or uncertainties of impacts) associated with radionuclide releases to the environment have not been acknowledged. In particular, long term impacts have not been addressed. No data have been presented on the persistence, accumulation, mobility and ultimate fate of the many radionuclides that will be released. Although a risk assessment methodology has been described, the predicted radionuclide releases under various upset conditions have not been described at all. The trajectory and dispersion of radioactive releases in the atmosphere and water are not well presented.

Carbon-14, iodine-129 and krypton-85 are not specifically mentioned. These long-lived radionuclides have half-lives and residence times in the atmosphere and hydrosphere sufficient for transport processes to distribute them over the globe (Nuclear Energy Agency, "Radiological Significance and Management of Tritium, Carbon-14, Krypton-85, Iodine-129 arising from the Nuclear Fuel Cycle," NEA Group of Experts, OECD, April 1980).

The levels of radiation that could lead to closure of food harvesting in the area, and the likelihood that such an event would occur, have not been presented.

6.1.2 Sewage Discharge (page A-9)

Mitigating measures to prevent shellfish contamination, (if appropriate) are not discussed.

6.1.5 Entrainment (page A-10)

Temperature rises in auxiliary cooling systems (as well as condenser and overall temperture rises) were not given. The maximum temperature may be important when considering impacts.

6.4 Monitoring (page A-20)

Plans for amending the monitoring program in response to evaluation were not described. Responsibilities and linkages of the several parties involved in monitoring were not presented.

CNA ANC

August 3, 1984

Mr. Robert G. Connelly
Co-Chairman
Lepreau 2 Environmental Panel
Federal Environmental Review Office
13th floor, Fontaine Building
200 boulevard Sacre-Coeur
Hull, Quebec
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Dear Mr. Connelly,

The Canadian Nuclear Association (CNA) is submitting this letter in response to the Panel's request for comment on the Environmental Impact Statement (EIS) for the Point Lepreau 2 nuclear generating station as prepared by Maritime Nuclear. We will begin by describing the CNA and some of its activities so that the Panel can better appreciate the vantage point from which we consider the EIS.

The CNA was founded in 1960 to promote the orderly and sound development of nuclear energy for peaceful purposes. The CNA consists of over 210 corporate member organizations, approximately one third from the public sector and the remainder from the private sector. Our members' interests range from fundamental research to nuclear power plant operation, from the exploration and mining of uranium to the storage of spent fuel and from the production of radionuclides for medical use to the manufacture and construction of some of the largest nuclear power stations in the world.

The CNA organizes a wide-range of seminars and conferences on such subjects as uranium mining, reactor design, safeguards and non-proliferation, reactor safety, waste management, quality assurance and nuclear standards, social and ethical questions, reactor marketing, etc.. The CNA has participated in the public issues associated with the development of nuclear power. During the past seven years we have made presentations to the Royal Commission on Electric Power Planning (Ontario) "Porter Commission", the Select Committee on Ontario Hydro Affairs, the Cluff-Lake Board of Inquiry (Saskatchewan) "Bayda Inquiry", the Royal Commission of Inquiry into Uranium Mining in British

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Columbia "Bates Commission", the Energy Committee of the New Brunswick Legislature and to the Uranium Inquiry - Nova Scotia "McCleave Commission". It is in this spirit of open discussion of the benefits and risks of nuclear power that we are submitting our comments on the EIS for Lepreau 2.

Various members of the CNA have reviewed in detail the environmental impact statement for Lepreau 2. In our view, the EIS responds well to the issues and guidelines set out for comment by the Panel. We appreciate however that in preparing a report of this length and complexity it is easy to omit some obvious benefits of the project. We will comment on what we see as additional supporting agreement for and benefits of Lepreau 2. Fortunately, the operating experience of the Point Lepreau I nuclear generating station provides an excellent data base from which to estimate the effects of the construction and operation of a second unit at Point Lepreau.

In this written response we wish to make some specific comments on areas which are of particular concern to this Association. These include:

1. Safety Performance Measurement
2. Potential for Major Accident Consequences
3. Decommissioning
4. Social and Economic Benefits

1. SAFETY PERFORMANCE MEASUREMENT

Section 2.9 presents a clear description of the rigorous public safety standards to which the station will be designed and constructed. Some important aspects of the CANDU safety management system were, however, not covered in the document.

First, the Atomic Energy Control Board (AECB) follows a policy of assigning members of their own staff to each nuclear station for audit and review of operation on a regular basis. These Site Officers have access to all station operating records as well as carrying the authority to review and report to their Board any instances in which the station is not being operated in compliance with the terms of the license or with its underlying intent. They also have been delegated considerable authority for immediate action to correct deficiencies. The advantages of this style of regulation recently have been recognized by the United States Nuclear Regulatory Commission; the AECB has used this system since the beginning of the CANDU program.

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Second, a number of tests are carried out during plant operation to ensure that the special safety systems are highly reliable. Testing of shutdown, emergency core cooling, and containment systems, for example, demonstrates that each of these systems is available for use (if required) at least 999 times out of 1000. Quarterly reports are submitted to the Atomic Energy Control Board containing these test results along with a number of other performance measures for the station. For example the fourth quarter 1983 report from Lepreau 1 (Reference 1) shows that safety performance standards were met or exceeded for the full year. This type of direct measurement and reporting is an important facet of the CANDU safety management system.

Third, a system for exchange of operating information between the owners of nuclear stations greatly broadens the experience base of, and support available to, any single operating unit. The CANDU Owners Group (COG) maintains such a system. It is administered at the present time by Ontario Hydro staff, and includes not only CANDU operating experience information but world-wide information as well through membership in the U.S. - based Institute for Nuclear Power Operations (INPO). INPO provides operating support services for all U.S. nuclear utilities and exchanges information through agreements with nuclear utilities in about fifteen other countries. Bilateral agreements for mutual support and assistance also exist between most CANDU owner utilities.

Fourth, New Brunswick Electric Power Commission follows an open information policy in dealing with the public. All significant operating incidents are reported promptly through press releases; staff are available to answer enquiries from the public on any aspect of the operation of the Lepreau 1 station. This open policy helps to ensure that utility staff take a responsible and prudent approach to station operation at all times.

2. POTENTIAL FOR MAJOR ACCIDENT CONSEQUENCES

The report properly describes the multi-level defenses which have been designed into the 600 MW station to prevent release of radioactive materials. The probability of occurence of a major accident is extremely small. Nonetheless, many people discount these arguments and retain a fear of "major disaster". Many of these concerns originated in the United States, where there has been a great deal of anti-nuclear activism over the past twenty years. It is worthwhile to point out a few facts which reveal that these fears are illusory.

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One of the common fear-generating scenarios is the postulated "meltdown" or "China Syndrome" accident. Aside from recent work in the U.S. which shows that there are no major consequences from this type of accident, Reference 2 points out that the chance of gross fuel melting in any accident sequence in a CANDU plant is essentially zero. It is well established that gross fuel melting is a necessary precursor to major public health consequences (e.g. Reference 3); therefore, no major disaster will occur regardless of the type of failure proposed.

The report describes the emergency procedures which are in place to warn residents of the occurence of a major accident, up to and including evacuation of the area. These plans are consistent with practice at other CANDU stations; such plans have been required by the Atomic Energy Control Board since the very beginning of the program. However, recent evidence indicates that evacuation may not be advisable because the risks to the people incurred during the process of moving out are likely greater than the radiation risks incurred by staying put. This point of view was first put forward in Reference 4. The basis for this position is that the actual behaviour of the important radioactive materials is very different than assumed in "conservative" accident analyses done up to the present time. Since Reference 4 was published in 1979, a great deal of work has been done on fission product chemistry around the world, including that summarized in Reference 2. This work has confirmed the initial hypothesis that most radioactive species would remain within the plant and immediate surroundings even after the most extreme accident. As a result, public consequences would be minimal. Allowing for the prudently slow process of peer review and regulatory acceptance, it is expected that evacuation procedures will be removed from nuclear station emergency plans around the world within the next ten years. In any case, the Action Guides given in Table E-2 of the EIS report are properly based on measured quantities; because of the fundamental chemistry properties of radioactive materials it is extremely unlikely that the more extreme action levels will ever be reached.

In summary, the fear of major accidents which motivates much anti-nuclear sentiment is not well founded in fact. This fear may be indirectly based on the fear of a nuclear explosion; it is worth reminding the Panel that such an explosion in a CANDU nuclear power plant is totally impossible.

With regard to the Environmental Assessment Review, the import of these comments is that the actual environmental impact of abnormal station operation is likely to be very

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much less than previously understood to be associated with operation of CANDU nuclear stations, particularly for the major accident end of the spectrum. The Panel can be assured that claims made in the Environmental Impact Statement tend to be pessimistic with regard to the overall level of public risk.

3. DECOMMISSIONING

With regard to the decontamination step of decommissioning, recent experience on preparation of Pickering A Units 1 and 2 for retubing supports the arguments presented in Appendix B, Section 5.3. The CANDECON process has been successful in markedly reducing the radiation fields of the primary heat transport systems. All fuel has been removed to the used fuel bay. Heavy water has been drained and the systems have been flushed with light water. It is expected that radiation levels will be sufficiently low on completion of these procedures that airlock doors can be opened to speed the retubing procedure. Radiation dose estimates for the retubing operation are being steadily lowered as more experience is gained. All of this experience will be available for future use in station decommissioning plans. A further point worthy of mention is that the 600 MW reactors are all constructed using materials with low concentrations of isotopes which are activated during reactor operation - a lesson learned from operation of earlier stations such as Pickering A. Eventual decommissioning of the 600 MW stations will result in lower levels of contamination and worker radiation dose. It is quite possible that complete dismantling would be feasible without a long waiting period (about thirty years), which is the reference plan given in the EIS report.

With regard to management of tritiated water, the most likely system would be to remove as much of the tritium as possible in a facility such as the Darlington Tritium Removal Facility, now under construction. Tritium removal technology will be well matured before Lepreau 2 reaches the end of its useful operating life. Detritiation will reduce the time required for tritium to decay to "de minimus" levels.

4. SOCIAL AND ECONOMIC BENEFITS

Section 7.0 predicates much of its findings on experience with Lepreau 1. There are, however, many areas of discussion which have not been addressed appropriately in light of the guidelines set out by the Panel.

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The project specific benefits of Lepreau 2, for example the employment impacts, including the number of years of employment, the nature of the jobs, how they would be sourced (e.g. stress on local hiring) are fairly covered. What tends to be missing is the complementarity and "fit" with New Brunswick's plans and policies on employment and training. Economic Impacts have been similarly treated. While procurements have been addressed, their relation to provincial industrial policies have been omitted.

Industrial benefits and spinoffs have received little attention. Several examples have been included but do little to outline the spinoffs that should result from a large megaproject such as a CANDU. Once again the provincial government's economic objectives are not addressed meaningfully.

While the social impacts appear to have been given adequate attention, the discussion does not describe what the methodology states to be needed.

"It is generally assumed that the external action will alter the established stability or general pattern of development in the region. The alteration may be either positive or negative and the effects of absolute costs and benefits is highly dependent upon the region's maturity, level of sophistication of development, goals, attitudes and values."

Little attention is directed at describing for example what economic goals local residents hold.

Because of the legitimate focus of the EIS on project specific considerations, many of the global benefits to New Brunswick and Canada of Lepreau 2 are passed over or undervalued. These benefits flow from the characteristics and timing of this trade oriented, energy megaproject. The expeditious implementation of the project will build on and extend the stream of benefits that continue to flow from Lepreau 1. It will enhance the credibility of New Brunswick as a source of economic energy not only in the Maritimes but along the U.S. eastern seaboard. In this large sense, Lepreau 2 could be the keystone to positioning the New Brunswick economy as a trading partner to the northeast quadrant of North America.

The construction and performance of Lepreau 1 stand in stark contrast to the uncertainty surrounding New England's attempts to meet their long-term electricity requirements. Lepreau 2 will be largely export-dedicated and will generate sufficient revenues to address shareholder equity positions and service long and short-term debt during its first 11 years. This will provide for a gradual and economic repatriation of power to New Brunswick in step with

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the requirements of long-term economic growth. Lepreau 2 can itself be the prelude to a commercial relationship with New England that could yield long-term benefits beyond Lepreau 2, (e.g. by enabling subsequent stations to be built).

The timing of Lepreau 2 is well suited to the industrial policy aspirations of New Brunswick. It permits, as noted above, continuity of the industrial capabilities demonstrated in the construction of Lepreau 1 at a time of continuing underutilization of the province's labour force (i.e. no scarcity induced inflationary pressure). The project could reinforce industrial spinoffs such as the in-province nuclear fuel industry.

Incidentally, these industrial spinoffs are not adequately dealt with because there has not been a comprehensive industrial benefits analysis conducted in the province (such a study was done in anticipation of the award of the lead contract for the frigate program to the Saint John shipyard).

The flexibility in the scheduling of the repatriation of electricity from the station should contribute to attracting new industry to the province (including electricity and heat intensive industries).

Lepreau 2 will establish an electricity trading relationship with New England that is complementary with Hydro-Quebec's long-term export strategy. The Maritime's long-term energy needs can also be accommodated through regional participation up front and/or at the time of repatriation.

Since the EIS tends to concentrate on in-province benefits, some of the regional, other provincial and Canadian benefits are not taken into account. For example, the capital in-flows during the construction phase would strengthen the Canadian dollar. Another national benefit not dealt with in the Environment Impact Statement is, of course, the contribution Lepreau 2 could make to Canada's indigenous nuclear industry capacity.

CONCLUSION

In these brief comments the CNA has tried to complement the benefits of the Lepreau 2 project as outlined in the Maritime Nuclear EIS.

The CNA believes that the EIS has demonstrated that

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Lepreau 2 can be constructed and operated while ensuring adequate public safety, a minimal impact on the environment and providing major positive economic benefits to New Brunswick.

The CNA supports proceeding with the Lepreau 2 project.

Respectfully submitted by:

Norman Aspin, Ph.D.
President

NA:jb

att/

References

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2. D.A. Meneley and W.T. Hancox, "LOCA Consequences Predictions in a CANDU-PHWR", Proc. International Conference on Nuclear Power Experience, International Atomic Energy Agency, Vienna (1982) IAEA-CN-42/14-5.

3. Reactor Safety Study, An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants, WASH-1400, (1975).

4. M. Levenson and F. Rahn, "Realistic Estimates of the Consequences of Nuclear Accidents", Electric Power Research Institute, Palo Alto, California (1979).

August. 3, 1984

Environmental Assessment Panel
Lepreau 11
c/o
Mr. Gerry Hill
Environment New Brunswick

Dear Sirs:

The Point Lepreau 11 Environmental Impact Statement does not address the concerns re. the off site Emergency Plan which I outlined to the panel at the scoping workshop Dec.9,1983.

Sincerely Yours
David H. Thompson
David H. Thompson
Chairman
Lepreau Emergency
Planning Committee

AUG 10 1984

Atomic Energy Control Board
Commission de contrôle de l'énergie atomique

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Our file Notre référence

26-1-24-0-0

le 2 août 1984

Monsieur Carol Martin
Bureau fédéral d'examen
des évaluations environnementales
Edifice Fontaine
Hull (Québec)
K1A 0H3

Objet: Point Lepreau 2: Enoncé d'incidences environnementales

Monsieur,

Pour faire suite à la lettre que vous nous adressiez au début de juin sur le sujet en rubrique, vous trouverez ci-joints les commentaires du personnel de la CCEA sur le rapport intitulé "Lepreau 2 Environmental Impact Statement".

Nous considérons que l'Enoncé d'incidences environnementales de Point Lepreau 2 est un rapport bien documenté et nous sommes généralement satisfaits de son contenu quant aux questions touchant les responsabilités de la CCEA. Nous sommes à votre disposition pour discuter de nos commentaires ou pour les expliciter davantage au besoin.

Veuillez agréer, Monsieur, l'expression de nos meilleurs sentiments.

Pierre Marchildon.

P. Marchildon
Gérant int., Division
Projets de réacteurs

PM/pn

cc: Z. Domaratzki
B.M. Ewing
W.R. Bush

Canada

AECB COMMENTS ON THE LEPREAU-2 ENVIRONMENTAL IMPACT STATEMENT

Section 2.7.4

We do not understand the sentence which states that "gaseous emissions are collected in holding tanks and released on a batch basis after sampling". In the present design, gaseous emissions are not collected in holding tanks.

Section 2.8.1

The AECB no longer makes use of advisory committees to review the engineering aspects and operating principles of each nuclear facility. The AECB staff has this responsibility and it makes recommendations to the Board concerning the issuance of construction and operating licences. An advisory committee on nuclear safety still exists, however, but its main role is to advise the Board on general safety principles and criteria associated with nuclear facilities.

Section 2.8.4

In the second paragraph it could be noted that thermoluminescent dosimeters measure beta as well as gamma exposure.

Table 2-1

The note at the bottom of the page should indicate that 1% of dose limit is a design and operating target. However, this target only relates to the "general public" limit (i.e. 5 mSv/annum) and not to the "radiation worker" limit.

Section 2.9.1

In addition to the reasons given for design changes it should be noted that changes may also be necessary if new experimental or analytical information, or future operating experience with CANDU stations, reveal significant safety-related inadequacies in the design of Point Lepreau 2.

Section 2.9.2

Under the heading "Redundancy", the sentence, "For example, where a valve is required to provide a service, three are installed to ensure that one will always be available" could be confusing. The triplication of the safety system instrumentation and logic is a good example of redundancy but it does not follow that three valves are always installed when only one would be sufficient.

Section 2.9.5

To be precise the first sentence on p. 2-51 should read "The accidents are either single failures, in which complete failure of a process system alone is assumed, or dual failures, in which one of the safety systems or part thereof is assumed to fail in addition to the process system failure".

The accident frequencies referred to in the second paragraph and in table 2-4 are "assumed maximum frequencies" rather than "permissible" frequencies".

Section 2.9.6

Maritime Nuclear has indicated its intention to use "acceptance criteria" shown in figure 2-12 for judging the results of the category B analyses. It should be noted that these criteria have not been accepted by the AECB. The AECB considers that a straight line relationship between event consequence and event frequency as shown in figure 2-12 is not appropriate. Further discussion between Maritime Nuclear and the AECB is necessary to define the method by which the category B events are to be identified and the criteria against which the results of the consequence analyses are to be judged.

Section 5.2

It should be noted that the AECB is in the process of amending the Atomic Energy Control Regulations. The most basic change will be the introduction of the concept of "effective dose equivalent" which together with other changes described in consultative document C-78 will result in revised dose limits. A copy of consultative document C-78 is enclosed for your information.

Sections 5.3 and 5.4

A statement should be added to indicate that "the sum of the ratio of quantity released to the DEL must not exceed one when summed over all radionuclides and all pathways to ensure that the dose limits are not exceeded". Such a statement is necessary since the DEL for each radionuclide is based on the dose limit.

Section 5.9

The last sentence in the last paragraph seems inconsistent with the last paragraph of section 3.3.4 (although it is recognized, as stated in section 3.3.4, that emissions measured to date, which could be attributable to Point Lepreau 1, are very small).

Section 8.1

In our view, the statement in the second paragraph that "to be effective, a monitoring program must lead to a practical result, i.e. the change in parameters monitored must be distinguishable from background" is not necessarily correct. A valid purpose of a monitoring program is to provide assurance that the contribution of the station to increasing the quantity of radionuclides in the environment continues to be very small.

Saint John Board of Trade
SINCE 1819

The Delta Brunswick
39 King Street
Saint John, N.B.
E2L 4W3 657-8111

August 2, 1984

Mr. Gerry Hill
Environmental Assessment Review
Point Lepreau II
P. O. Box 6000
Fredericton, N.B.
E3B 5H1

Dear Mr. Hill:

Thank you for the copy of Lepreau 2, Environmental Impact Statement Summary.

After reviewing this document, we would like to express our support of the work done to date by the Environment Assessment Panel.

As you are aware the Saint John Board of Trade supports the construction of Point Lepreau II with two major reservations. These reservations are:

a) an export market for the power generated should be in place so as not to overburden the New Brunswick taxpayer;

b) suitable attention is paid to the socio-economic impact of Point Lepreau II on the surrounding communities including Saint John.

We believe that attention has been paid to the question of impact on Saint John and support the recommendation made in the report for the establishment of a committee to monitor this aspect. We also understand that steps are being undertaken to assure that the negative factors, particularly in the labour scene, do not take place.

.../2

AUG 10 1984

We understand that the mandate of EAP does not include the area of sale of power but we would like to see some concrete evidence from NB Power that contracts are in place for the sale of the power.

Overall, we feel that the EIS does address the major problems and we look forward to the announcement of public hearings on the matter.

Sincerely,

Lynda Heffernan

Lynda Heffernan
General Manager

LAH/ph

Saint John Fundy Region
Development Commission Inc.

August 10, 1984

Dr. John Foster
Assistant Director
Huntsman Marine Laboratory
Brandy Cove
St. Andrews, NB E0G 2Z0

Dear Dr. Foster:

RE: Lepreau II
Environmental Assessment

In a telephone conversation with Mr. Paul Monty, he suggested we forward our enclosed letter to you.

It contains some thoughts the Commission has about Lepreau II, could you please include our comments with the overall assessment your panel is undertaking.

Yours truly,

Don O'Leary

Donald F. O'Leary
General Manager

DFO/td

Enclosure

Saint John, Sussex, St. Andrews, St. Stephen, St. George, Hampton
P.O. BOX 1971, SAINT JOHN, NEW BRUNSWICK, CANADA E2L 4L1 TEL. (506) 658-2916

Saint John Fundy Region
Development Commission Inc.

August 7, 1984

Environmental Assessment Panel
Lepreau II

The Saint John Fundy Region Development Commission's purpose is to support and promote industrial growth and expansion in our Region.

Lepreau I has given the Region the experience and understanding of what positive and negative effects mega projects such as a nuclear reactor can have on the area.

The concerns of nuclear power: radio-activity, community life style, emergency planning, de-commissioning, etc. must again be addressed and properly answered to assure confidence and acceptance within the Region of a second nuclear reactor.

Although we are very much concerned about the effects of a second nuclear power reactor in our Region the Saint John Fundy Region Development Commission emphasizes economic growth and we want this project to have beneficial economic effects on the Region. Some areas that must be addressed are:

(1) Markets - Considering the present competition from other energy sources attempting to sell in the New England marketplace, we would expect definite long-range commitments for the purchase of power produced.

(2) Construction Overruns - Costs should be as firm as possible (including union commitments) before construction ever begins. Knowledge of construction costs should keep increases in the pricing of power produced, within reasonable levels to make the product competitive in the marketplace.

(3) Labor/Management - The construction process should not be interrupted by labor/management conflicts which cause contruction delays and overruns, and poor morale.

.../2

Saint John, Sussex, St. Andrews, St. Stephen, St. George, Hampton
P.O. BOX 1971, SAINT JOHN, NEW BRUNSWICK, CANADA E2L 4L1 TEL. (506) 658-2918

(4) Suppliers - Construction material suppliers and operations suppliers should be local whenever possible. We understand the project requires many materials not available locally, however local suppliers should be offered the opportunity of providing anything they can for the project. The permanent employment created should be within the Region and not with outside suppliers who simply ship goods into the Region.

These are some of the immediate concerns about a mega project the size of Lepreau II. Mega projects are often of a short-term duration and often disrupt and distort the local economy long after construction completion. Your concern is only with the initial impact of Lepreau II. Our concern is with long-range economic development in the Region and we want economic development effects of a longer term than Lepreau I. However, we are experiencing high unemployment and a quiet economy and Lepreau II could start movement again in the Region. Therefore our initial response is to proceed with the project, keeping in mind the realistic economic effects (both good and bad) it will produce.

Yours truly,

G Forbes Elliot

G. Forbes Elliot
Chairman

GFE/td

185 (2/84)

Inter - Office Memo
Note Interservices

1984/08/02

Name and Title / Nom et titre	[illegible]	Telephone / Téléphone	[illegible]
Paul Monti	The Environment		
Anne Caverhill	Social Services		

Flora Jeane Kennedy

Lepreau 2 - Environmental Impact Study

I have reviewed the Environmental Impact Statement and offer the attached remarks for your consideration.

On behalf of the mandate of our Department to provide support and improve the social well-being of the residents of New Brunswick, I was pleased to be made aware of the Statement and its recognition of the impact Lepreau 2 will have on the social environment of the Saint John community.

To be completely honest, however, I found the descriptions to be somewhat lacking in depth and understanding of the actual impact the proposed project will have on the area. The reasoning behind this remark is expanded upon in the attached.

I trust these comments will be of assistance to you and wish you well in your endeavors.

Anne Caverhill
....

AC:fpc

Att.

ENVIRONMENT N. B.
ENVIRONMENTAL SERVICES BR.

AUG 7 1984

FILE..........................
X FILE..........................

COMMENTS RESPECTING LEPREAU 2

ENVIRONMENTAL IMPACT STATEMENT

4.0 Description of the Socio-Economic Development

Consideration should be given to whether Lepreau 2 would be a "good or bad" venture for New Brunswick, not only from the economic view but on the set of values inherent in approval or disapproval of an additional nuclear reactor. In addition to this, the advantages stipulated in describing this proposed project should be more readily assessed in conjunction with the negative aspects associated with such a change.

Housing:

Discussion and analysis of potential future trends could center around the vacancy rate and housing costs, the people who will suffer if disposable incomes decrease and increasing mortgage rates, as well as the secondary set of social problems created by housing difficulties.

Education:

How will the school system cope with estimated closures? Do staff in the system have the experience and expertise to equip them for variations in enrollment?

Social Services:

It is axiomatic that changes in economic and employment opportunities will have both a direct and indirect impact on the community services required by any given area. Rising wage rates and inflation will have a profound effect on those with fixed income; rapid build-up of an itinerant work force followed by a permanent settlement of people can result in an increased crime rate, alcoholism, prostitution and the misuse of narcotics. These problems have the potential to severely strain available funds for social services. This should be discussed in the Statement.

F

Health Care:

More information could be offered describing how the hospitals in the Saint John area will contend with a growth in population (i.e., additional staff).

In addition -- are the mental health facilities adequate?

Police:

More citizens in the work force will result in more police. A dramatic increase in numbers will mean additional facilities required for additional staff.

An increase in crime would add a further burden to the court system and necessitate increasing the number of judges.

CONCLUSION:

The Environmental Impact Statement has been reviewed with interest, particularly the sections highlighting the potential impacts of Lepreau 2 on the Social and Economic Development. And, although it is anticipated that the social effects of this project will be restricted to the area within the immediate vicinity of the plant site, the effects of the project could still be more expansive in light of the domino effect that itinerant labour has on a community.

Because of this, it is my view, as a research and planning officer of the Department of Social Services, that a more indepth analysis should have been made of the potential social changes Lepreau 2 could effect. This is not to infer that such changes will take place but simply to be aware in the Statement of the realistic expectation for their existence.

13

The Canadian Manufacturers' Association
L'Association des manufacturiers canadiens

One Yonge Street, Toronto, Ontario M5E 1J9
(416) 363-7261 Telex: 065-24693

F.E.A.R.O.
B.F.E.E.E.
File/Réf: 4300-2/1
AUG/AOÛ [illegible] 1984
REC'D / REÇU

August 1, 1984

Mr. Robert G. Connely
Co-Chairman
Lepreau II Environmental Panel
Federal Environmental Review Office
13th Floor, Fontaine Building
Hull, Quebec
K1A 0H3

Dear Mr. Connely:

The Canadian Manufacturers' Association has stated repeatedly that industry's single most important energy priority is to have adequate and secure sources of energy in the right forms, at the right time and place and at internationally competitive prices. In keeping with this priority the CMA has examined the Environmental Impact Statement submitted by Maritime Nuclear for the proposed second 600 megawatt CANDU reactor at Point Lepreau and wishes to go on record as endorsing its conclusions and wholeheartedly supporting the development of Lepreau II.

In considering Maritime Nuclear's system development strategy, it is noteworthy that it provides the lowest cost electric power available in the Maritimes, at rates considerably lower than those prevailing in the neighbouring New England states. The cost advantages enjoyed in New Brunswick are largely due to Maritime Nuclear's strategy of developing large sized, more economic units by using transmission interconnections with neighbouring utilities to the fullest possible extent. Additionally, since approximately 80% of the cost of nuclear power is fixed for the life of the plant, Point Lepreau power will provide Maritime Nuclear with a stabilizing influence in its power rights.

A project of the magnitude of Lepreau II will increase expenditures in both the construction and operational phases thereby creating new direct and indirect marketing opportunities for manufacturers in New Brunswick and Canada.

... 2

CMA GETS THINGS DONE
Vancouver • Edmonton • Winnipeg • Toronto • Ottawa • Montréal • Moncton • Charlottetown • Halifax • St. John's

In terms of the direct and indirect impact on manufacturing of the building of Lepreau II, during the construction phase, 1985-1989, it is estimated that there will be a $4.2 billion increase in Canadian manufacturing activity spread over the five year period. The greatest benefits would accrue for New Brunswick manufacturers with shipments expected to increase by an average of $480 million each year through the construction phase. This would represent a 14% expansion in provincial manufacturing activity. There would also be a significant expansion in manufacturing elsewhere in Canada, with shipments expected to grow by an average of $350 million a year.

In terms of 1990 and beyond, the operation phase of Lepreau II would provide an important new $151 million a year market for Canadian manufacturers. Annually, manufacturing activity in New Brunswick would be expected to increase by more than $45 million while the expansion elsewhere in Canada would be about $106 million. The spectrum of manufacturing affected ranges from goods specifically used in the proposed project to those used by the commercial, industrial and public sector involved directly and indirectly with the project.

New Brunswick is not blessed with an abundance of natural energy resources. The one Canadian resource and technology available to New Brunswick which can be readily constructed and operated within the province is Nuclear Power. Pursuing the course of nuclear generation will make New Brunswick more self sufficient in energy and at the same time will develop nuclear expertise and jobs within the Province. Equally important, it will stabilize the power rates within New Brunswick, allowing existing and future businesses and homeowners to plan for their future more effectively.

The Canadian Manufacturers' Association believes the information provided in the Environmental Impact Statement addresses the issues contained in the guidelines. At the present time the existing unit, Lepreau I, is operating well and releases of radionuclides from the facility are well below the allowable Atomic Energy Control Board limits and are only a fraction of the natural background level. Information in the Environmental Impact Statement indicates that with the addition of a second unit, all regulatory requirements will be met.

For all of the foregoing reasons, The Canadian Manufacturers' Association respectively urges that favourable consideration be given to Maritime Nuclear to proceed with the development of Lepreau II.

Yours sincerely,

Roy Phillips

Roy A. Phillips
President

G.R. Cluney
Vice-President, New Brunswick
Branch

— C.M.

Electrical and Electronic Manufacturers Association of Canada
One Yonge Street, Suite 1608, Toronto M5E 1R1
(416) 862-7152

F.E.A.R.O.
B.F.E.E.E.
File:
Ref: 4300-21
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July 26, 1984

Mr. Carol Martin
Secretary, Lepreau II
Environmental Assessment Panel
Federal Government of Canada
Ottawa, Ontario
K1A 0H3

Dear Mr. Martin:

We have carefully reviewed the Environmental Impact Statement (EIS) prepared by Maritime Nuclear in connection with the Lepreau II project. Our review focused specifically on the socio-economic issues. We have enclosed our comments for your information.

We endorse the Lepreau II project as a sound proposition with significant benefits to the New Brunswick economy in particular, and generally to the Canadian economy as a whole.

We will be happy to appear before the Lepreau II Environmental Assessment Panel and provide our viewpoints on this important project.

Yours truly,

David E.P. Armour,
President

dd

ELECTRICAL AND ELECTRONIC MANUFACTURERS
ASSOCIATION OF CANADA (EEMAC)

COMMENTS ON THE ENVIRONMENTAL IMPACT STATEMENT (EIS)

1. Economic Impact on New Brunswick

Lepreau II will result in significant economic benefit to the Province of New Brunswick. In our opinion, the projected labour requirements of 11,000 person-years on-site trades, labour supervision, engineering and design and 1,000 person-years of commissioning will provide good stimulus to the labour market.

Construction wages are projected to add $62.5 million per year over the 6½ year construction period. The total direct and indirect effect of the wages will be $156 million per year.

The Lepreau II project must be considered from the point of view of the overall impact it will have on many segments of New Brunswick's economy.

2. Economic Impact on Canada

(a) The Canadian economy will benefit from the $1.2 billion investment proposed for Lepreau II. As we have demonstrated in our Impact Study*, an investment project of this magnitude will result in economic activity in almost all the provinces of Canada.

(b) Lepreau II electricity sales to the United States will have a positive effect on our balance of trade with the United States.

* An EEMAC study using Statistic Canada's Interprovincial Model

(c) Lepreau II will provide additional momentum to CANDU export activity.

3. Impact Analysis

The analytical work done on the socio-economic impacts of Lepreau II is of a very high order. The data is consistent with the similar impact studies done on major energy projects. The data on employment, multipliers, etc... compare favourably with our own studies.

Health and Welfare Canada
Santé et Bien-être social Canada

Health Protection Branch
Direction générale de la protection de la santé

Radiation Protection Bureau
775 Brookfield Road
Ottawa, K1A 1C1

F.E.A.R.O.
B.F.E.E.E.
File:
Ref:
JUL JUIL 31 1984
REC'D / REÇU

July 26, 1984

Mr. Carol Martin,
Panel Secretariat,
Environmental Assessment Panel,
Lepreau II,
Federal Environmental Assessment
Review Office,
13th Floor,
Fontaine Building,
Hull, Québec.
K1A 0H3

Dear Mr. Martin:

The Lepreau 2 Environmental Impact Statement (EIS) has been reviewed by Dr. Bliss Tracy, Dr. Roger Eaton, Dr. Eric Veska and myself.

The issue from our perspective is whether the addition of this reactor to the Pt. Lepreau site will result in undesirable health risks due to routine releases of radioactivity. We are also of course concerned with exceptional releases. Our experience in measuring environmental radioactivity around other multireactor sites (Pickering and Bruce) and recent experience around Pt. Lepreau would lead us to agree with the proponents conclusion (p 5-15) that the radiation dose will be a small fraction of that received from natural background under ordinary conditions. However, because each reactor setting is unique, it is necessary to continue to confirm these conclusions through environmental monitoring programs.

Our comments tend to be concerned with omissions, some of which result from recent developments and for which the consultant cannot be held responsible. These omissions are detailed on the attached pages. In general we found insufficient information in the EIS to assess independently the dose to the most exposed individual. In the context of the Guidelines prepared by the Lepreau II Environmental Assessment Panel, we note that not all the information requested by the Panel has been included. Specifically, radionuclide releases during accident/upset conditions have not been addressed. We feel that more detail on this point would assist in gaining acceptance of the study.

...2

The health concerns raised in the scoping workshops were also reviewed. The EIS has adequately described the health effects in Section 5.8 and the difficulties inherent in trying to establish a health monitoring program to detect changes.

I hope you find this information useful.

Sincerely,

Dorothy Meyerhof

D.P. Meyerhof,
Chief,
Environmental Radiation
Hazards Division.

DPM:njh

Att.

Detailed Comments

Lepreau 2 Environmental Impact Statement

D.P. Meyerhof
B.L. Tracy
R.S. Eaton
E. Veska

Environmental Radiation Hazards Division
Radiation Protection Bureau

In this review reference was made to the Guidelines issued by the Lepreau II Environmental Assessment Panel:

Section 5. Approach to the Assessment of Issues para. 4. "Impact predictions should be stated explicitly and the basis for predictions clearly presented".

Section 6. Issues to be Examined in the E.I.S.
- 6.1 Impacts on the Biological Environment
  - 6.1.1 Radionuclides
- 6.2 Impacts of Radiation on Humans
- 6.4 Monitoring
- 6.5 Emergency Planning

Detailed Comments

Panel Guidelines:

6.1 Impacts on the Biological Environment

6.1.1 Radionuclides

Relevant sections in the EIS

2.9 "Safety Design and Analysis"
3.1.3 "Climate"
5.0 "Releases of Radioactivity to the Environment
6.1 "Heat Dissipation"
Appendix E "Emergency Planning"

Comments:

1. It will be interesting to see the changes that the heat dissipation studies (Section 2.9) and the tritium release experiments referred to on pages 5-10 and 5-11 have on the aqueous dilution properties for radionuclides.

2. With respect to meteorological information, there is no mention of whether or not a meteorological tower exists on site or whether more detailed studies are planned to develop a site specific atmospheric dispersion model. We noted that the wind rose data in one of the previous EIS's for Lepreau I dates from 1939-1951.

3. One minor frustration is that the pre-and post-operational tritium data given in Section 3 (pp 3-46 and 3-53, respectively) are in different units and therefore not directly comparable. More than one year of information would have given more substance to the phenomenon of increased tritium levels during periods of high humidity (summer months) and substantiated the claims that there have been only very small changes since Lepreau I became operational.

6.2 Impacts of Radiation on Humans

Relevant Sections in the EIS

5.0 "Releases of Radioactivity to the Environment"

Comments:

1. The dose given for the most exposed individual is low and of the same magnitude as given in the previous EIS's (30 μSv/y) and by Ontario Hydro for Pickering (also 30 μSv/y). The result would have

more impact if a description of the most exposed individual had been included in the present EIS (we realize that it is given in the DEL document). Also, some indication of the distribution of individual doses in communities around the site would give more perspective. (cf Panel request for doses at 1, 5, 10 km).

2. Breakdown of doses by various pathways is not included, nor are analyses of the effect of unusual occurrences.

6.4 Monitoring

Relevant Sections in the EIS

3.3 "Environmental Radiation"
5.0 "Releases of Radioactivity to the Environment"
8.2.1 "Environmental Monitoring"

Comments:

1. With some dismay and disappointment we noted that our monitoring program carried out in cooperation with the New Brunswick Department of Health has not been mentioned. This, in spite of the fact that reports and results have been exchanged with NBEPC and that a cooperative tritium analysis program was carried out with NBEPC for 7 years. In addition the results and information were provided to the Federal Environmental Assessment and Review Office to be sent to the proponent.

2. Section 5 (pg 5-2 last sentence) raises expectations that there will be a description of "... how the operational environmental monitoring program compliments the emission data"; but the information does not seem to have been included.

3. Section 8.2.1 (pp 8-2 and 8-3) is a reference to the detailed description in Sections 3.2 and 3.4 of the monitoring that has been carried out but does not address the questions posed by the Panel. In particular, the "feedback loop" (see comment 2) has not been addressed - how results are evaluated to ensure that the program is optimal and how the results are related to emission monitoring and controls.

6.5 Emergency Planning

Relevant Sections in the EIS

2.9 "Safety Design and Analysis"
2.12 "Emergency Planning"
Appendix E - "Emergency Planning"
Appendix F - "Listing of Postulated Accidents which form the Safety Analysis Requirements"

Comments:

1. The reference to the Department of National Health and Welfare and the Radiation Protection Bureau have been given incorrectly on page E-5.

2. In reference to national level emergency planning (page E-5), the Federal Nuclear Emergency Response Plan (FNERP) has been completed and distributed to the Provinces. The Department of National Health and Welfare has been designated the lead department to coordinate federal response to nuclear emergencies. Under the FNERP a Federal Nuclear Emergency Control Centre would be established with the Director of the Radiation Protection Bureau as Coordinator.

3. Page E-12. There are references to "Emergency reference doses" and "emergency response doses". These terms appear to describe the same thing but consistency would make the document easier to understand.

ENVIRONMENT NEW BRUNSWICK
ENVIRONNEMENT NOUVEAU-BRUNSWICK

July 23, 1984

Mr. Robert C. Connelly, and
Dr. Leandre Desjardins
Co-Chairmen, Point Lepreau II
Environmental Assessment Panel
c/o Mr. Paul Monti
Environment New Brunswick
P. O. Box 6000
Fredericton, NB
E3B 5H1

Dear Sirs:

Following a review of the "Point Lepreau II Environmental Impact Statement" by departmental staff, there are a number of comments relevant to Environment New Brunswick concerns previously raised at the Lepreau II scoping sessions. These are discussed below according to their placement in the subject document.

Section 2.4.3 (and 3.1.2) Fresh Water Systems - Our initial concern about flow guaging Hanson Stream to ensure the security of the fresh water supply has not been addressed. The document states that the Hanson Stream can meet the Lepreau I and II freshwater needs, however it is unclear as to how this conclusion was arrived at in the absence of the requested data.

Section 2.10.1 Inactive Waste Treatment Facility - The document states that the effluent discharge from the facility conforms to criteria prescribed by Environment New Brunswick. This is clearly not the case. Data collected from September to January 1983 shows that the standard monthly average and the standard instantaneous maximum for suspended solids in effluent from the solids separation lagoons were frequently in excess of prescribed standards. (See data attached)

Section 3.3.3.5 Summary of Measurements of Radioactivity in Water (Well Water) - The preoperational monitoring program for Point Lepreau I included ground water samples taken from bore holes at the site of the Solid Radioactive Waste Management Facility prior to it being placed in service. These samples were analysed for gamma emitting radionuclides.

In view of the stated objective of this monitoring program "to provide a reference base for comparison with future environmental measurements from the Operational Environmental Radiation Monitoring Program", it would seem logical to expect a continuation of this on-site monitoring activity. This does not appear to be the case, and it is therefore suggested that on-site ground water monitoring be continued as part of the operational monitoring program.

Section 6.2.2 Sanitary Waste Discharge - The New Brunswick Department of the Environment and not the New Brunswick Department of Health establishes Biochemical Oxygen Demand (BOD) and Suspended Solids (SS) concentration limits in effluent.

The document correctly states that chlorination of the effluent is not provided, although this was initially not the case. During construction of Lepreau I, chlorination of effluent was required due to the large waste volumes being generated. This was continued to the operational phase of the plant but was discontinued following a review by ENB in September of 1982.

Section 6.2.4 Inactive Liquid Waste Treatment Facility Effluent discharge - As previously stated (see comments on 2.10.1), effluent discharge criteria are not being met for this facility. This section does not accurately reflect the degree to which this is occuring (suspended solids exceeded standard instantaneous maximum of 40 mg/l for 8 of 9 sampling periods, with values ranging from >40 mg/l to 3716 mg/l), nor does it discuss possible operational reasons for the problem.

Section 6.2.11 Ultimate Fate of Operational Chemicals - Further clarification is requested as to the meaning of "is reduced to non-toxic levels...." in the third paragraph.

I trust that you will take these comments into consideration when preparing the final review for the Point Lepreau II Environment Impact Statement.

Yours truly,

D. R. Sillphant
Acting Deputy Minister

POINT LEPREAU GENERATING STATION

NON-NUCLEAR WASTE EFFLUENT DATA

1983 SUMMARY

SUSPENDED SOLIDS

MONTH	Monthly Average *	Instantaneous * *
Dec.	No Data Submitted	
Nov.	No Data Submitted	
Oct.	No Data Submitted	
Sept.	36	82
Aug.	64	140
July	668	3716
June	378	1474
May	26	88
April	13	23
March	18	69
Feb.	67	220
Jan.	14	>>40

* Standard Monthly Average 20 mg/l.

** Standard Instantaneous Maximum 40 mg/l.

4300-21

DEPARTMENT OF HEALTH
P.O. BOX 6000
FREDERICTON, N.B., CANADA
E3B 5H1

NEW BRUNSWICK
NOUVEAU-BRUNSWICK

MINISTÈRE DE LA SANTÉ
C.P. 6000
FREDERICTON, N.-B., CANADA
E3B 5H1

July 12, 1984

Mr. Paul Monti
Panel Secretariat
Environmental Assessment Panel
Lepreau II
Environment New Brunswick
P. O. Box 6000
Fredericton, N. B.
E3B 5H1

Dear Mr. Monti:

Thank you for sending a copy of the Environmental Impact Statement for Lepreau II.

I have reviewed the document with the assistance of Public Health Services staff and have a few comments to make.

From a general perspective we believe that a significant public health issue will be the continued anxiety and publicity regarding the ultimate disposal of rad wastes.

There is also some potential for controversy surrounding the predistribution of K.I. pills. Although this is of questionable value we have decided to err on the side of caution and preparedness. Many other jurisdictions do not predistribute the pills. Perhaps it should be stated in the appendix, page E-4 that the Department of Health maintains an up-to-date supply of potassium iodide to some 1500 individuals in the immediate Lepreau area as well as a stockpile in the city of Saint John.

In Section 3.3 there is no mention of the joint monitoring program conducted by the Radiation Protection Bureau, Department of National Health and Welfare and Radiation Protection Services, New Brunswick Department of Health. If information on this activity is required please contact Mr. Keith Davies, Senior Radiation Physicist, Public Health Services (453-2067).

Yours sincerely,

James Wolstenholme

J. A. Wolstenholme
Assistant Deputy Minister
Personal Health Services

JAW/sdh

ENVIRONMENT N. B.
ENVIRONMENTAL SERVICES BR.
JUL 16 1984
FILE P.M.
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